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WAR MACHINE

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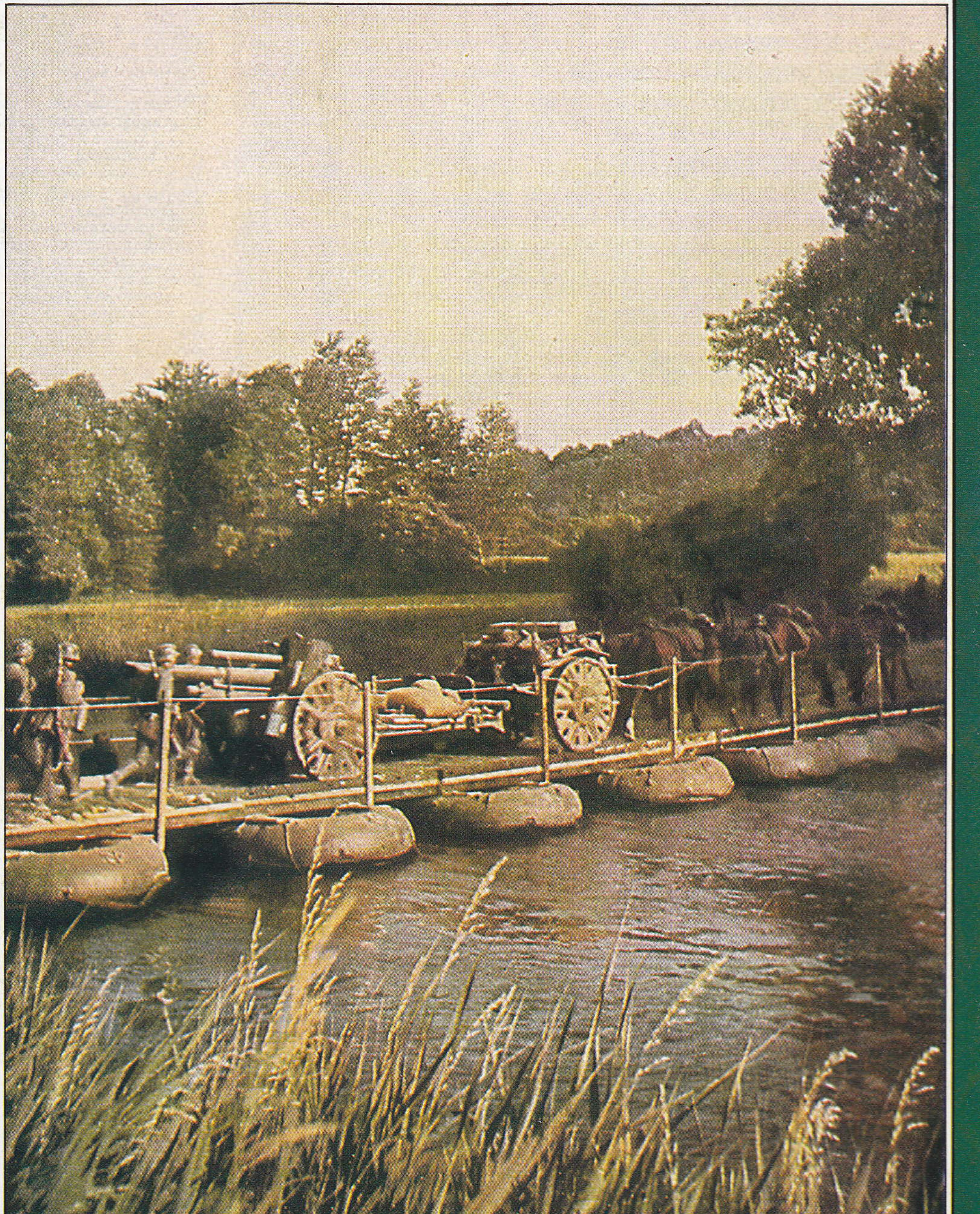
Armed Forces of the World: US Air Force (Part 7)

Guns versus Howitzers – Design and Tactics

British Artillery at El Alamein

The German 105-mm Howitzers



A fully illustrated guide to Field Artillery of World War II

WAR MACHINE

Volume 5 **Issue 51**

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Armed Forces of the World

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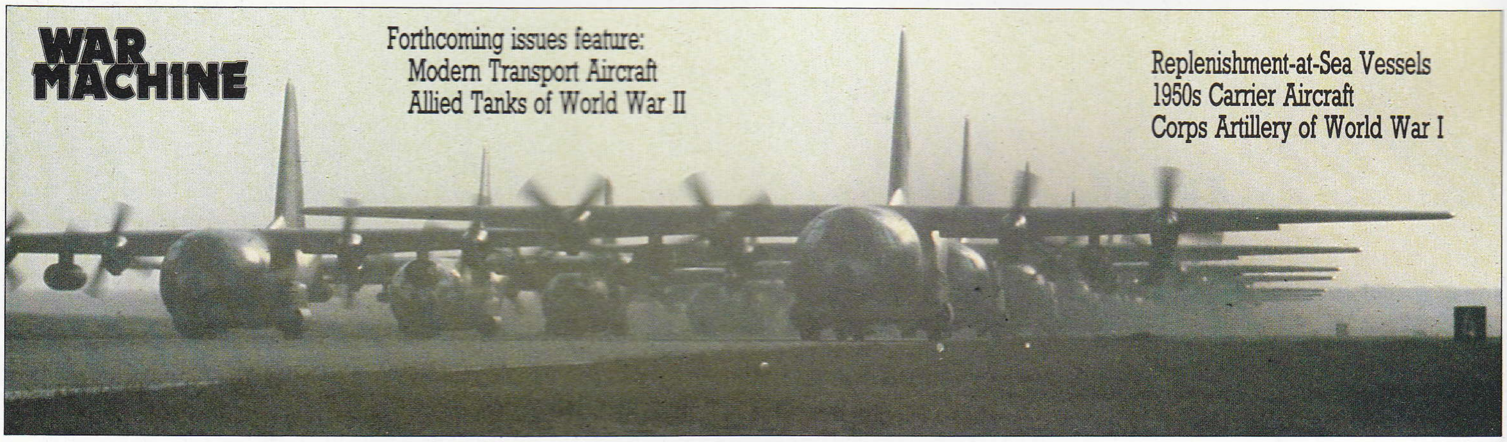

WAR MACHINE

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1950s Carrier Aircraft
Corps Artillery of World War I

Field Artillery of World War 11

The American 105-mm Howitzer M2A1 was the standard US Army field piece by 1945, when this example was in action on a Pacific island. It went on to serve all over the world in many armies and is still in widespread use today. This M2A1 is firing from an unusually well-protected emplacement.

From the earliest days of gunpowder, artillery has often had a decisive impact upon the battlefield. The evolution of field artillery meant that armies could carry their own fire support with them, and by 1939 the field gun was an important weapon of all major armies.

Field artillery, be it guns or howitzers, plays the major part in providing fire support for other arms of the service to operate. Without the covering fire of field artillery, effective infantry and armoured operations would be all but impossible, while time and again throughout military history it has been demonstrated that artillery fire support saves lives. It makes the enemy keep his head down as an attack goes in, it disrupts his supply lines and it destroys his installations and weapons.

By 1939 field artillery had grown into a well-established and well-organized arm in all major armies. Whatever its nationality, each army had ready for use a well-exercised chain of artillery command and a well-tried chain of communication. Without these two essentials field artillery could not, and still cannot, operate. It must have its orders carefully handed along a sensible command network and its orders must arrive at the correct place in as short a time as possible.

In all this interlocking system the guns and howitzers have only one part to play: they are but the delivery system for what is really the gunner's weapon, the projectile. The gun merely acts as the method of delivering that projectile, but this is often forgotten in the attraction that artillery has for so many. The guns of all nations are constantly cosseted and cleaned in a way no electronic black box can ever be, for each gun somehow acts as a gleaming example of a gunner's pride in his role and function: it is the guns that win battles, it is the guns that control the destinies of nations, and it is the guns upon which are lavished the care that would otherwise go to such equally intangible symbols as a regiment's colours.

Thus the guns and howitzers discussed here are just a part of a much larger method of waging war. The selection contained here is merely an example. There were far more types and models of artillery pieces used during World War II than are shown in these pages, but these equipments are a good cross-section of all types used, from the ancient to the modern and from the little-used to the mass-produced.

In the multitude of terrains fought over during World War II, the wide open spaces of the Western Desert proved an almost ideal laboratory for the development of tank, air and artillery tactics. It was in this theatre that the famed British 25-pdr made its initial mark.

FRANCE

Canon de 75 mle 1897

During World War I the French '75' or, more formally, the **Canon de 75 modèle 1897**, passed into French national legend as the gun that enabled the French to win the war. It was famous even before 1914 as what may now be regarded as the first of all modern field artillery designs: it coupled a highly efficient recoil mechanism with a rapid-action breech design and a carriage that enabled hitherto unheard-of rates of fire to be maintained. Before 1914 the 75 was a virtual state secret but once in action it more than proved its worth, to the extent that the French army depended on its high rate of fire to make up for deficiencies in the availability of heavier artillery weapons.

By 1939 the 75 was rather past its best, and was outranged by more modern field gun designs, but the French still had well over 4,500 of them in front-line use. Other nations also had the 75. The list of these nations was long for it included the USA (which was producing its own **75-mm M1897A2** and **75-mm M1897A4** versions), Poland (**armata polowa wz 97/17**), Portugal, many of the French colonies, some Baltic states, Greece, Romania, Ireland and many other nations. The 75 of 1918 was also very different from the 75 of 1939 in many cases. The Americans and Poles had introduced split trail carriages to the 75 in place of the original pole trail, and many nations (including the French) had introduced rubber-tyred wheels for motor traction in place of the original spoked wheels.

The 75 has also undergone some other changes in role. Before 1918 many 75 barrels had been placed on rudimentary anti-aircraft carriages, both static and mobile, and despite their limited value many were still around in 1939. The 75 has also undergone some adaptation as a form of tank weapon, but it was to be left to the Americans to make the full development of this possibility when they later adapted the type as the main gun for their M3 and M4 tank series. In France the 75 was updated to **Canon de 75 modèle 1897/33** standard with a new split trail carriage, but by 1939 there were few of these in service.

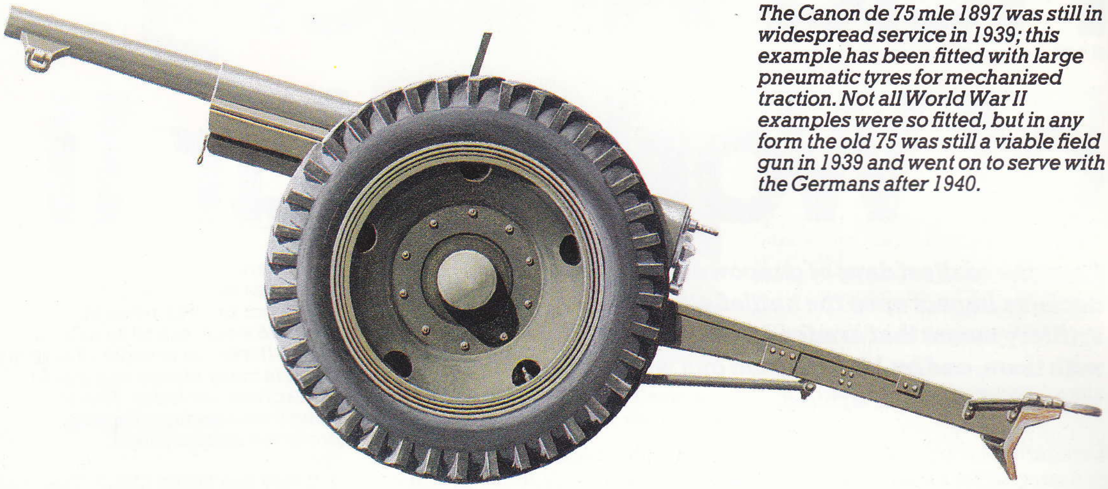
In the shambles of May and June 1940 huge numbers of 75s fell into the hands of the Germans, who were only too happy to use many of them for their own purposes as the **7.5-cm FK 231(f)** or, more commonly, as the **7.5-cm FK 97(f)**. At first many were issued to occupation garrisons and second-line formations, while others were later incorporated into the beach defences of the Atlantic Wall. Many more were stockpiled ready to be on hand when some use could be found for them. That came during 1941 when it was discovered the hard way that the armour of the T-34/76 Soviet tank was invulnerable to nearly all the German anti-tank weapons. As a hasty stopgap improvisation the stockpiled 75s were taken from the storerooms, fitted with strengthening bands around the barrel and placed on 5-cm Pak 38 anti-tank gun carriages. A muzzle brake was fitted and special armour-piercing (AP) ammunition was hastily produced. the results were rushed to the Eastern Front and there they proved just capable of tackling the Soviet tank armour. This rushed improvisation was known to the Germans as the **7.5-cm Pak 97/38** and was really too powerful for the light anti-tank gun carriage, but it worked for the period until proper anti-tank guns arrived on the scene.

The 7.5 cm Pak 97/38 was not the only war-time development of the 75, for later the Americans developed the 75 to the stage where it could be carried in North American B-25 bombers as an anti-ship weapon.

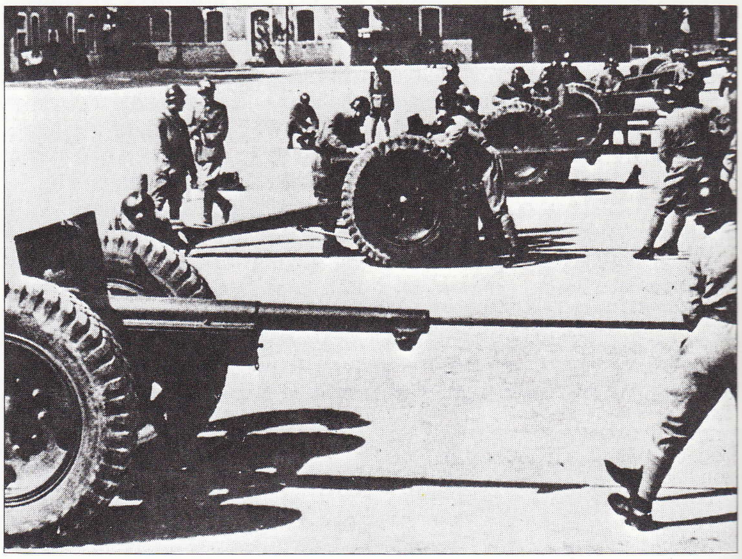
After 1945 the 75 lingered on with many armies, and it would not be surprising if it is still in service here and there. In its day it was an excellent artillery piece that well deserved its famous reputation.

Specification

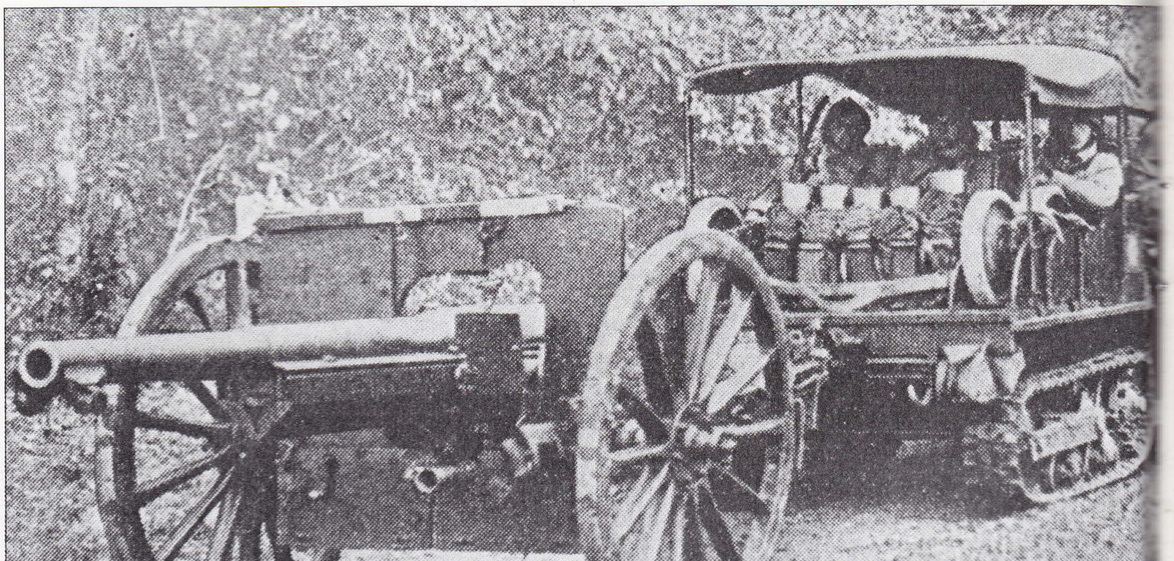
Canon de 75 modèle 1897
Calibre: 75 mm (2.95 in)
Length of piece: 2.72 m (107.08 in)
Weight: travelling 1970 kg (4,343 lb) and in action 1140 kg (2,514 lb)
Elevation: −11° to +18°
Traverse: 6°
Muzzle velocity: 575 m (1,886 ft) per second
Range: 11110 m (12,140 yards)
Shell weight: 6.195 kg (13.66 lb)



The Canon de 75 mle 1897 was still in widespread service in 1939; this example has been fitted with large pneumatic tyres for mechanized traction. Not all World War II examples were so fitted, but in any form the old 75 was still a viable field gun in 1939 and went on to serve with the Germans after 1940.



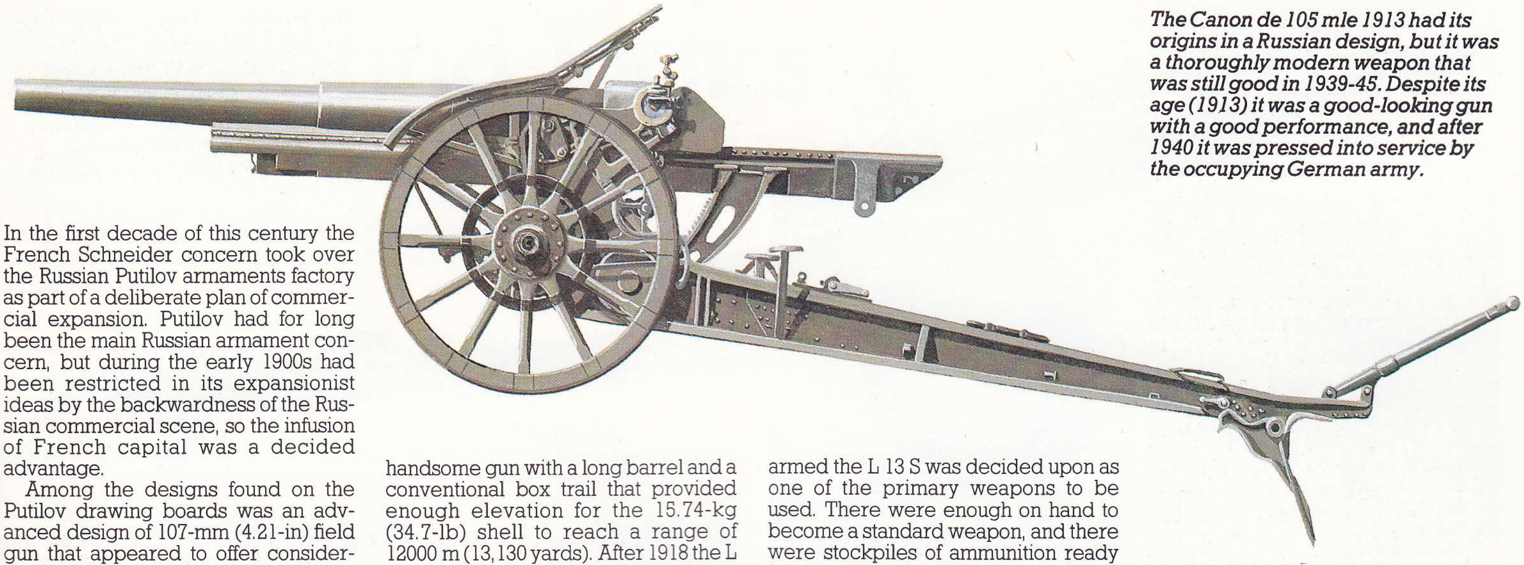
Right: French gunners after a range training session. These 75s have all been fitted with the large pneumatic tyres, but still retain the original 1897 carriage and shield. Note the lug under the muzzle that engaged with the recoil cylinder at full recoil.



Below: Not all the mle 1897 guns were fitted with tyres for pneumatic traction, as demonstrated by this example on tow behind a Citroen-Kegresse half-track.

FRANCE

Canon de 105 mle 1913 Schneider



The Canon de 105 mle 1913 had its origins in a Russian design, but it was a thoroughly modern weapon that was still good in 1939-45. Despite its age (1913) it was a good-looking gun with a good performance, and after 1940 it was pressed into service by the occupying German army.

In the first decade of this century the French Schneider concern took over the Russian Putilov armaments factory as part of a deliberate plan of commercial expansion. Putilov had for long been the main Russian armament concern, but during the early 1900s had been restricted in its expansionist ideas by the backwardness of the Russian commercial scene, so the infusion of French capital was a decided advantage.

Among the designs found on the Putilov drawing boards was an advanced design of 107-mm (4.21-in) field gun that appeared to offer considerable increase in range and efficiency over comparable models. Schneider eagerly developed the model and offered it to the French army, which was at first not interested as the 75 was all it required and there was no need for heavier weapons. But eventually the Schneider sales approach triumphed and in 1913 the Russian design was adopted by the French army as the **Canon de 105 modèle 1913 Schneider**, more usually known as the **L 13 S**. The events of 1914 rammed home to the French the fact that the 75 was not capable of supplying all the artillery fire support required, and that heavier guns would be necessary. Thus the L 13 S was placed in a higher priority bracket and large numbers began to roll off the Schneider production lines.

Between 1914 and 1918 the L 13 S provided sterling service. It was a handsome gun with a long barrel and a conventional box trail that provided enough elevation for the 15.74-kg (34.7-lb) shell to reach a range of 12000 m (13,130 yards). After 1918 the L 13 S became a French export as it was either sold or handed on to numerous armies under French influence. These nations included Belgium, Poland and Yugoslavia but it was in Italy that the L 13 S achieved its main market penetration. There the L 13 S became the **Cannone da 105/28,** and it remained one of the main field guns of the Italian forces until 1943. The Poles modified their L 13 S guns to take a new split trail design, and this **armata wz 29** was in service when the Germans attacked in 1939.

After 1940 the Germans found that the L 13 S was a viable weapon and out of the 854 still in French service in May 1940 they captured many that were still intact. Large numbers were handed over to various occupation units but it was not until 1941 that a real use was found for the bulk of the booty. When the Atlantic Wall was ready to be armed the L 13 S was decided upon as one of the primary weapons to be used. There were enough on hand to become a standard weapon, and there were stockpiles of ammunition ready for use. Thus the L 13 S became the German **10.5-cm K 331(f)** and was ready to play its most important part in World War II. Ex-Belgian guns were designated **10.5-cm K 333(b)**.

The Germans took the guns off their carriages and mounted them on special turntables protected by curved or angled armour shields. These were placed in bunkers all along the French and other coasts, and many of the bunkers can still be seen among the Atlantic sand dunes to this day. As a beach defence gun the L 13 S was more than suitable, and the bunkers were hard nuts for any attacking force to crack. Fortunately the Normandy landings of June 1944 bypassed most of these bunkers. Not all the guns in these bunkers were directly ex-French; some found their way into the defences from as far away as Yugoslavia and Poland. Captured guns used by the Germans were the **10.5-cm K 338(i)** and **10.5-cm K 338 (j)** Italian and Yugoslav weapons, while unmodified and modified Polish weapons were the **10.5-cm K 13 (p)** and **10.5-cm K 29 (p)** respectively.

Specification

L 13 S
Calibre: 105 mm (4.134 in)
Length of piece: 2.987 m (117.6 in)
Weight: travelling 2650 kg (5,843 lb) and in action 2300 kg (5,070 lb)
Elevation: –0° to +37°
Traverse: 6°
Muzzle velocity: 550 m (1,805 ft) per second
Range: 12000 m (13,130 yards)
Shell weight: 15.74 kg (34.7 lb) for French guns and 16.24 kg (35.8 lb) for Italian guns

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FRANCE

Canon de 105 court mle 1935 B

By the mid-1930s the French artillery park was beginning to take on the appearance of an antique supermarket. The vast bulk of the weapons in service were items retained from World War I, and if not already obsolete were at best obsolescent. Most of the weapons involved were 75s, which despite their one-time excellence had their limitations by the 1930s and were also unable to produce the plunging fire that was so often required when attacking fixed defences. Thus the need was forecast for a new field piece capable of easy transport for the support of mechanized forces, and two weapons were produced as the result of this forecast.

The first was a weapon known as the **Canon de 105 court modèle 1934 S**. It was a Schneider design which was entirely orthodox in design and appearance yet possessing a relatively short barrel. Although the mle 1934 was designated a gun, it had more in common with a howitzer. The mle 1934 was ordered into production, but only at a low priority as more was expected of a slightly better design.

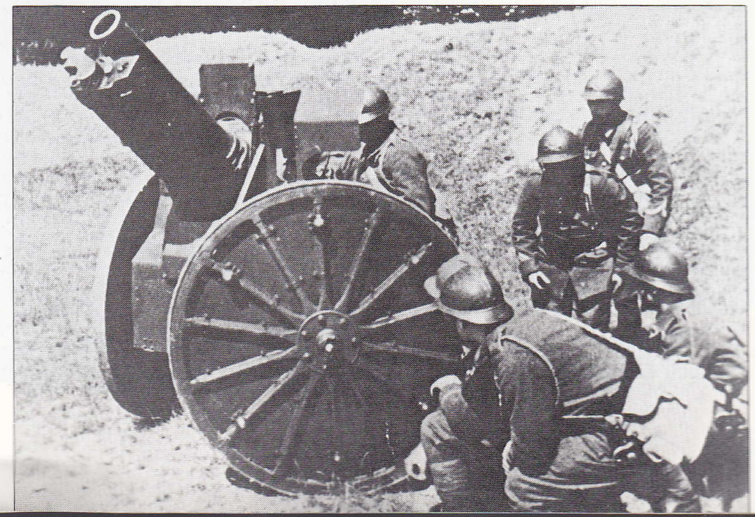
The better design was a product of the state-run Atelier Bourges and appeared during 1935, hence the designation **Canon de 105 court Modèle 1935 B** (*court*, for short, and B for Bourges). The mle 1935 was a very advanced design for its day, and it too had a relatively short barrel, shorter in fact even than that of its Schneider equivalent. The carriage had a split trail which, when opened, also splayed the wheels outwards to improve crew protection. Once spread the trails were held in place with large spades that were pushed down into the ground through the trail extremities. The wheels could be either large steel items with solid rims or more modern designs with pneumatic tyres for towing by Laffly tractors. The rate of fire was about 15 rounds per minute, which was quite high for a weapon of its calibre.

The mle 1935 was ordered into production, but this was slow to the extent that although 610 were initially ordered this total was never reached. Instead production was terminated in 1940 in order to permit the churning out of more anti-tank guns, which were by then realized as having a higher operational priority. Thus there were only 232 mle 1935s in service when the Germans attacked in May 1940 (and only 144 of the Schneider mle 1934s). In action they proved to be excellent little field pieces, so much so that the Germans took over as many as they could. The Germans recognized the mle 1935 for what it was and gave it a howitzer designation as the **10.5-cm leFH 325(f)**. The weapons were used for training purposes and by various second-line occupation units. Some have been recorded as being incorporated into various coastal and beach defences. The mle 1934 became the **10.5-cm leFH 324(f)**.

Specification

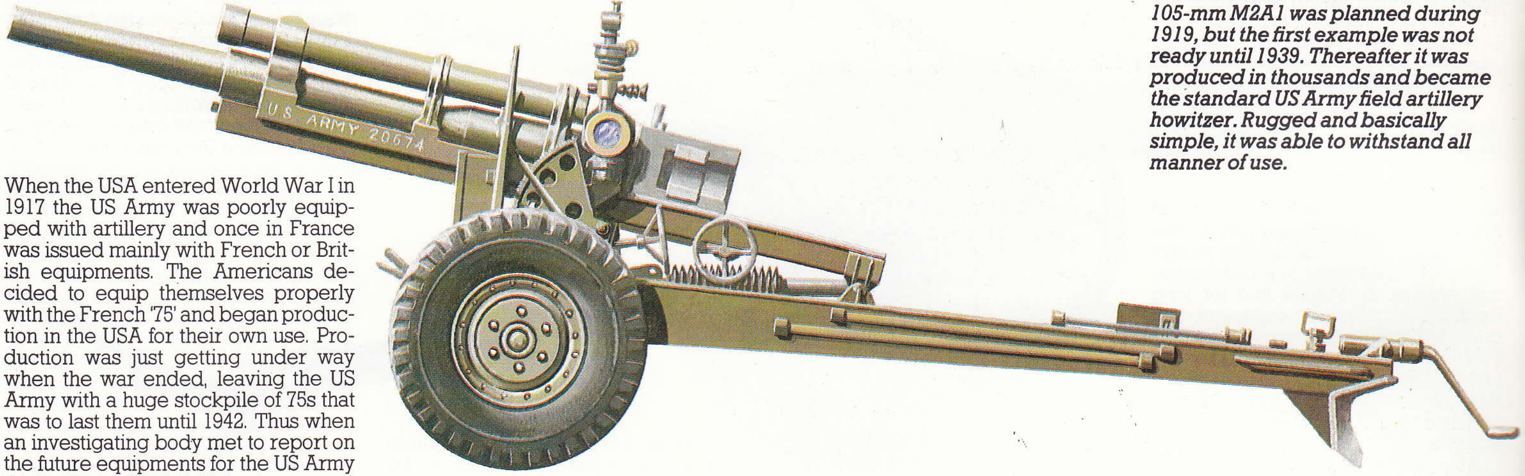
Canon de 105 court mle 1935 B
Calibre: 105 mm (4.134 in)
Length of piece: 1.76 m (69.3 in)
Weight: travelling 1700 kg (3,748 lb) and in action 1627 kg (3,587 lb)
Elevation: –6° to +50°
Traverse: 58°
Muzzle velocity: 442 m (1450 ft) per second
Range: 10300 m (11,270 yards)
Shell weight: 15.7 kg (34.62 lb)

This photograph of a Canon de 105 mle 1935 B provides a good indication of how the steel carriage wheels were 'toed in' to provide extra protection for the carriage and gun crew.



USA

105-mm Howitzer M2A1 – Carriage M2A2



The howitzer that was to become the 105-mm M2A1 was planned during 1919, but the first example was not ready until 1939. Thereafter it was produced in thousands and became the standard US Army field artillery howitzer. Rugged and basically simple, it was able to withstand all manner of use.

When the USA entered World War I in 1917 the US Army was poorly equipped with artillery and once in France was issued mainly with French or British equipments. The Americans decided to equip themselves properly with the French '75' and began production in the USA for their own use. Production was just getting under way when the war ended, leaving the US Army with a huge stockpile of 75s that was to last them until 1942. Thus when an investigating body met to report on the future equipments for the US Army the findings of their initial reports were not implemented.

The investigating body was the Westerveldt Board of 1919, and among its recommendations was the desirability of a 105-mm (4.13-in) howitzer. At the time little was done to put the suggestions into practice, so it was not until 1939 that the design of the proposed howitzer was completed. The weapon was placed into production the following year and thereafter the **105-mm Howitzer M2A1** poured off the American production lines in thousands.

The M2A1 was destined to become one of the most widely used of all American weapons in World War II. A measure of its success can be seen in the fact that it is still in widespread service in this decade, and even now some production batches are still run off.

The M2A1 was an orthodox piece of artillery with little of note in its overall design. The associated **Carriage M2A2** was a split-trail design with the gun assembly mounted in such a way that the centre of balance was just forward of the breech. The weapon was never intended for animal traction and so was fitted with rubber-tyred wheels from the outset. Overall the weapon was heavy for its calibre, but this meant that strength was so 'built-in' that the howitzer never seemed to wear out. The barrel and carriage could take enormously hard use and still keep firing.

The M2A1 was used in all theatres where the US forces fought, from Europe to the Pacific. Throughout the war years the basic design was the subject of numerous trials and improvements, and the ammunition underwent the same development process. By the time the war ended the range of ammunition fired by the M2A1 ranged from the usual HE through to propaganda-leaflet shells, various smoke marker shells and tear gas shells. Not all of the 105-mm (4.13-in) howitzers were towed. Some were placed on various self-propelled carriages, one of the most widely used being the M7, known to the British gunners who used it for a while as the 'Priest'. Later, Sherman tank chassis were used to mount the howitzer, and there was at least one attempt to mount the M2A1 on a half-track. Thus the M2A1 was able to provide fire support for armoured formations as well as infantry formations, and was among the first such weapons to provide mobile fire support, even though many others had undergone trials for the task.

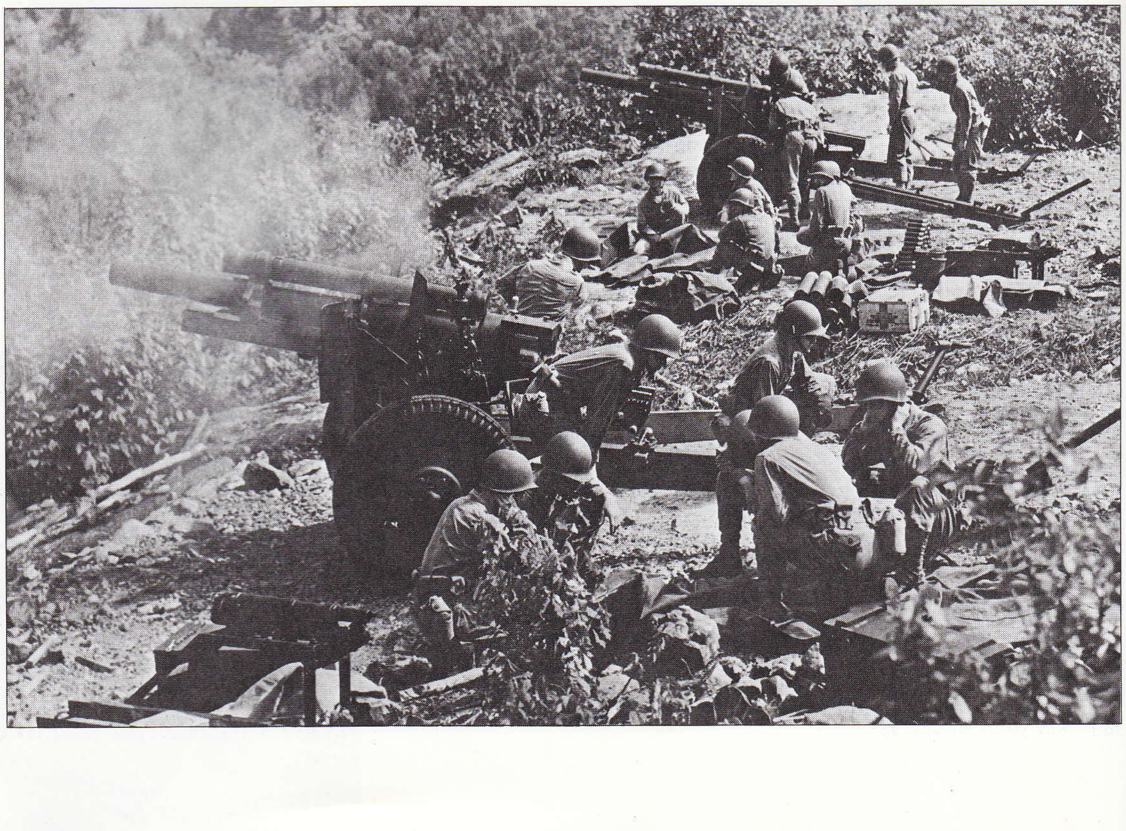
Post-war the M2A1 was given a later form of designation (it is now the **M102**) and it is still a front-line weapon with the US Army and of the armies of many other nations. It is still used as a yardstick by which other artillery designs are measured.

Specification

Howitzer M2A1
Calibre: 105 mm (4.134 in)
Length of piece: 2.574 m (101.35 in)
Weight: travelling and in action 1934 kg (4,260 lb)
Elevation: −5° to +65°
Traverse: 46°
Muzzle velocity: 472 m (1,550 ft) per second
Range: 11430 m (12,500 yards)
Shell weight: 14.97 kg (33 lb)

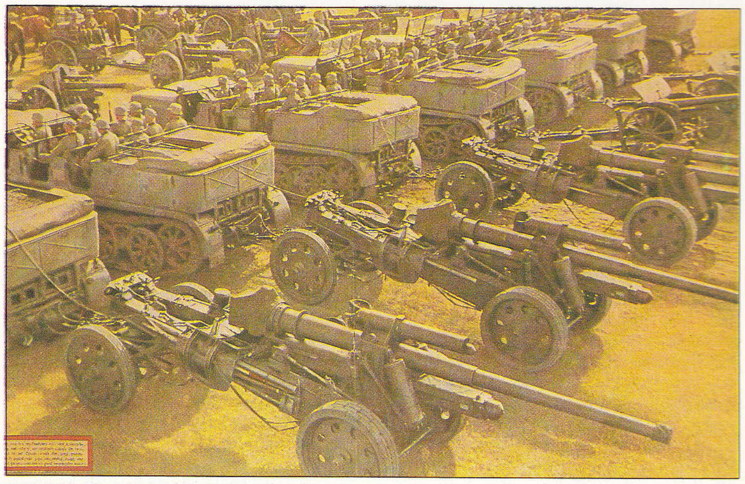
Right: A 105-mm Howitzer M2A1 in action during the Korean War. Although taken in 1950, this photograph could be typical of many actions in which the howitzer was used in World War II. The M2A1 was eventually re-designated M102, and it is still in service with the US Army Reserve.

Below: 105 mm Howitzer M2A1s on a training range. In the foreground is a 37-mm (1.45-in) sub-calibre barrel that was used mounted over the barrel during training to decrease costs by firing smaller calibre and cheaper ammunition and to reduce wear and tear on the full-calibre howitzer barrels.



Guns versus Howitzers - Design and Tactics

Guns and howitzers are both artillery pieces, and have been in common and large-scale use for centuries. Yet there are significant differences both in design and use between the gun and howitzer, and World War II saw both in extensive action.



The German K18 was long-barrelled and extremely heavy. Until the advent of the heavy half-track it took two teams of horses to tow the weapon in two loads, so in the largely horse-drawn German army of 1939 the K18 was not popular.

To the layman the gun and the howitzer are one and the same thing, but to the gunner they are very different beasts. They are not only constructed differently but they are even deployed in action in different ways and with different targets in mind.

The gun was for many hundreds of years the most common form of artillery piece. In artillery terms it fires in the lower register only (at low angles of barrel elevation), so that the fired projectile travels in a relatively straight line. To make matters more complicated the gun usually uses only one propellant charge contained in a fixed case (the projectile and the 'cartridge' case are one unit and are loaded into the breech as a single item). This combination of a fixed charge and a relatively flat projectile trajectory makes the gun ideal for attacking with a very high degree of accuracy targets that stand well out in the open. Guns are usually long-barrelled devices.

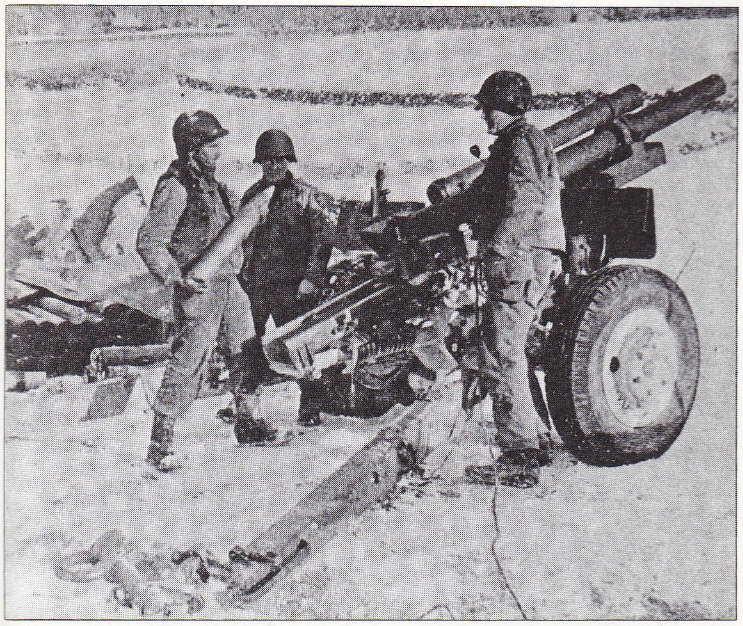
In contrast howitzers are usually short-barrelled devices. Developed from the ancient family of weapons known as 'mortars', howitzers are used primarily to fire in the upper register (at high angles of barrel elevation) so that the projectiles climb upwards and fall to Earth in a highly curved trajectory. By juggling with a variable charge system, the howitzer can be used to fire on targets that are quite close to the firing point, and by elevating the barrel above about 45° (i.e. in the upper register) the projectile can be made to fall with great accuracy at ranges well below those possible using full charge and fully 45° elevation. Thus the howitzer is said to have a variable charge system, and the projectile is loaded into the breech separately from the charge, which is usually contained and loaded in fabric bags. The howitzer may thus be regarded as a more complicated artillery system than the gun, but it provides the gunner with a far greater operational flexibility than the gun. For a start, the curved trajectory enables the gunner to engage targets that may be behind some sort of protection (such as the curve of a hill), and it was the howitzer that spelled the demise of the classical fortification. The gunner can also use the variable charge system to suit the target type and range. For instance, a protected target may be engaged by any number of charge and elevation angle combinations, both high and low angle and high or low charges.

In practice a gun, having more range than the howitzer, can be placed well back from a front line for firing. The howitzer is generally placed well forward to allow its variable charge system full rein.

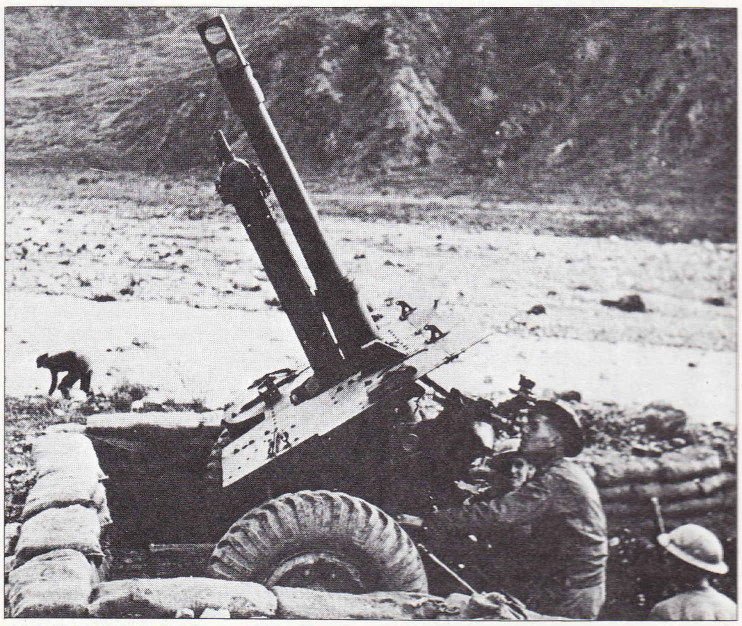
To make optimum use of both types of weapon, many artillery organizations once had provision for both in their battle arrangements. In British practice up to the end of World War I artillery regiments (battalions) had two batteries of field guns and one of field howitzers, but after the 'Great War' there was a definite tendency to produce new designs that combined the attributes of both the gun and the howitzer. The 25-pdr was one of the very first of these gun-howitzer compromises. The 25-pdr was often used with the barrel at low angles of elevation, but the charge system was variable and the propellant was loaded separately. Today the divisions between gun and howitzer are even less obvious. Recent designs such as the 155-mm (6.1-in) FH-70 used by three NATO nations are termed howitzers but have very long barrels (to reach ranges of 24000 m/26,245 yards) and they are frequently fired as guns once were.

But in World War II the divisions between the two were still quite marked. The Germans plumped almost universally for howitzers as the mainstay of their field batteries. They decided that the flexibility of the elevation and charge system of the howitzer outweighed the utility of guns, and there was one other factor involved. That is that the howitzer generally speaking fires a larger projectile than the equivalent calibre of gun, for in most armies field guns tend to have a calibre of around 75 mm (2.95-in), while the equivalent calibre of howitzer to match these guns is 105 mm (4.13-in), and that means a considerably heavier projectile.

Considered in terms of extremes, the two best examples of field guns and howitzer that can be quoted are the Soviet 76.2-mm (3-in) Field Gun Model 36 and the American 105-mm (4.13-in) M2A1: even a quick visual comparison between the two will emphasize the long slender barrel of the Soviet gun and the far stubbier barrel of the American howitzer. In between is the example of the hybrid 25-pdr, using not only a calibre intermediate to both but the best points of both systems. Today such fine divisions have all but vanished.



The American M102 with its short barrel and high elevation is a classic example of the field howitzer, firing a relatively large shell in comparison to a field gun of the same weight.



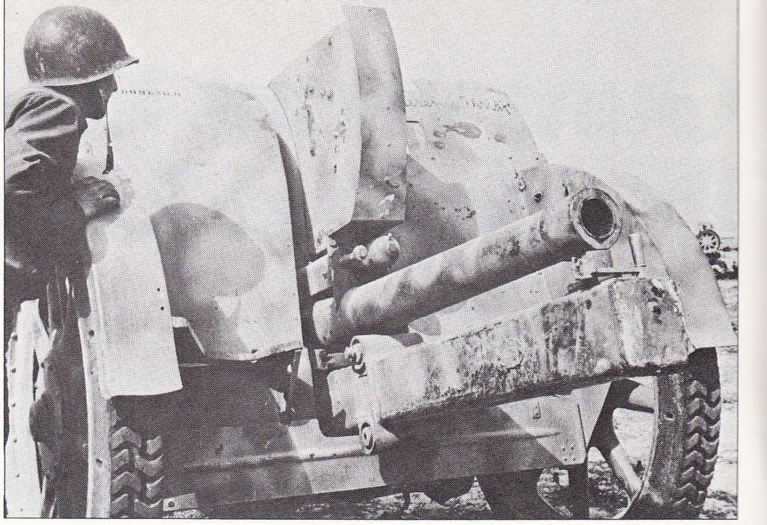
The British 25-pdr was a classic weapon of World War II. Superficially a howitzer, it was often used in gun roles (indeed, even as an anti-tank gun); it came to be known as a gun-howitzer and was used in either role.

ITALY

Cannone da 75/27 modello 06 and Cannone da 75/27 modello 11

One of the most elderly of all field artillery pieces still in service during World War II was the Italian army's **Cannone da 75/27 modello 06** (gun of 75 mm, 27 calibres long, model 1906, in the standard way of interpreting Italian artillery designations). This was originally a German Krupp export model adopted by the Italian army in 1906 and retained thereafter until 1943.

The original Krupp designation was **M.06**, and the weapon was an entirely orthodox design with little of note other than a sound and sturdy construction. The carriage used a form of one-piece pole trail which restricted elevation and thus range, but for all that the 75/27 still had a useful range for a field gun. Not surprisingly, the original models had wooden spoked wheels for horse traction, but by 1940 some had been modified to take all-steel wheels and rubber tyres for powered traction, and it was this model that was most usually encountered outside the Italian mainland. The steel-wheeled gun was widely used throughout the North African and other Italian colonial campaigns, and was at one point issued to German field batteries in North Africa when their own equipment was not available. The Germans even supplied the 75/27 with their own designation, **7.5-cm FK 237(i)**. So widespread was the use of the 75/27 modello 06 in Italian service that there were even special versions produced for use in fixed fortifications.



An American soldier examines a captured Cannone da 75/27 modello 11. This had a barrel that elevated independently of its recoil mechanism.

The modello 06 was not the only 75/27 in Italian service. To confuse matters somewhat there was also a **Cannone da 75/27 modello 11**. This was another licence-built gun, this time from a French source, namely the Deport design centre. The 75/27 modello 11 had one unique feature, namely the original design of recoil and recuperator mechanism. On nearly all artillery pieces the recoil/recuperator mechanism is situated alongside the barrel, either above or below it and in some cases both. On the modello 11 the mechanism stayed in the horizontal position and the barrel elevated independently. The operation of the system was in no way impaired, but this feature did not catch on with other designers and soon fell into abeyance.

Nevertheless the modello 11 was still in widespread Italian service in 1940 and was used mainly in support of cavalry units, although some were issued to field batteries. As with the modello 06 some were modified to take steel wheels with rubber tyres for powered traction and some were also used by the Germans at one time or another as the **7.5-cm FK 244(i)**.

Specification

Cannone da 75/27 modello 06
Calibre: 75 mm (2.95 in)
Length of piece: 2.25 m (88.6 in)
Weight: travelling 1080 kg (2,381 lb) and in action 1015 kg (2,238 lb)
Elevation: −10° to +16°
Traverse: 7°
Muzzle velocity: 502 m (1,647 ft) per second
Range: 10240 m (11,200 yards)
Shell weight: 6.35 kg (14 lb)

Specification

Cannone da 75/27 modello 11
Calibre: 75 mm (2.95 in)
Length of piece: 2.132 m (83.93 in)
Weight: travelling 1900 kg (4,190 lb) and in action 1076 kg (2,373 lb)
Elevation: −15° to +65°
Traverse: 52°
Muzzle velocity: 502 m (1,647 ft) per second
Range: 10240 m (11,200 yards)
Shell weight: 6.35 kg (14 lb)

ITALY

Obice da 75/18 modello 35

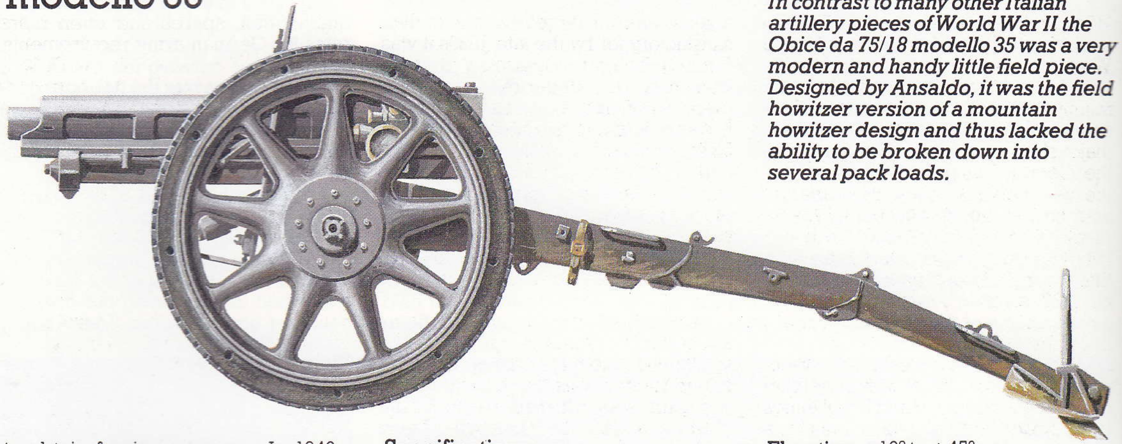
Ever since the establishment of Italy as a nation, a certain sector of its armed forces has associated itself with the specialized art of mountain warfare. This has included the provision of special types of artillery adapted for the mountain role. Many of these mountain artillery pieces came from the Austrian firm of Skoda, and during World War I the Italians were happily firing Austrian mountain guns at their former suppliers.

By the 1930s much of this mountain artillery material was obsolescent and overdue for replacement. The Italian firm Ansaldo thus undertook to produce a new mountain howitzer design. By 1934 this had emerged as the **Obice da 75/18 modello 34**, a sound and thoroughly useful little howitzer that was intended for the mountain role and could thus be broken down into eight loads for transport. In the interests of standardization and logistics it was decided that the 75/18 was just what was required as the light howitzer component of the normal field batteries, and thus the weapon was ordered for them as well, but this time with a more orthodox carriage with no provision for being broken down into loads. This field version became the **Obice da 75/18 modello 35**.

The modello 35 was ordered into full-scale production but like its contemporary, the modello 37 gun, could not be produced in the numbers required. This was despite the fact that the carriage used by the modello 35 howitzer had many features in common with the later modello 37 gun, and the same barrel and recoil mechanism as that used for the mountain howitzer was carried over to the field howitzer design.

The supply situation was not eased in any way by the need for the Italians to sell the modello 35 abroad in order to obtain foreign currency. In 1940 a sizable batch was sold to Portugal, and more went to some South American states to pay for raw materials. More production capacity was diverted to the production of versions for use on various forms of Italian *semovente* (self-propelled) carriages, but very few of these ever reached the troops. Those that did proved to be as efficient as any of the comparable German *Sturmgeschütze* (assault guns).

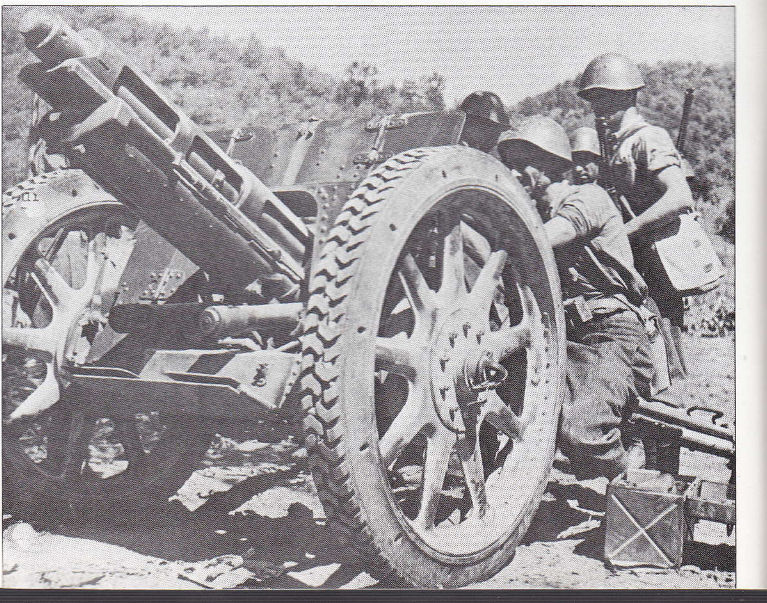
After 1943 the Germans took the modello 35 under their control as swiftly as they took over the rest of the available Italian gun parks, and the little howitzers took on a new guise as the **7.5-cm leFh 255(i)**.



In contrast to many other Italian artillery pieces of World War II the Obice da 75/18 modello 35 was a very modern and handy little field piece. Designed by Ansaldo, it was the field howitzer version of a mountain howitzer design and thus lacked the ability to be broken down into several pack loads.

Specification

Obice da 75/18 modello 35
Calibre: 75 mm (2.95 in)
Length of piece: 1.557 m (61.3 in)
Weight: travelling 1850 kg (4,080 lb) and in action 1050 kg (2,315 lb)
Elevation: −10° to +45°
Traverse: 50°
Muzzle velocity: 425 m (1,395 ft) per second
Range: 9565 m (10,460 yards)
Shell weight: 6.4 kg (14.1 lb)



Italian gunners undergo training on an Obice da 75/18 modello 35. The box by the wheel contained the sights, not ammunition. That no firing was intended can be deduced by the fact that a dust cover is still in place over the muzzle. The small size of this howitzer can be clearly seen.

ITALY

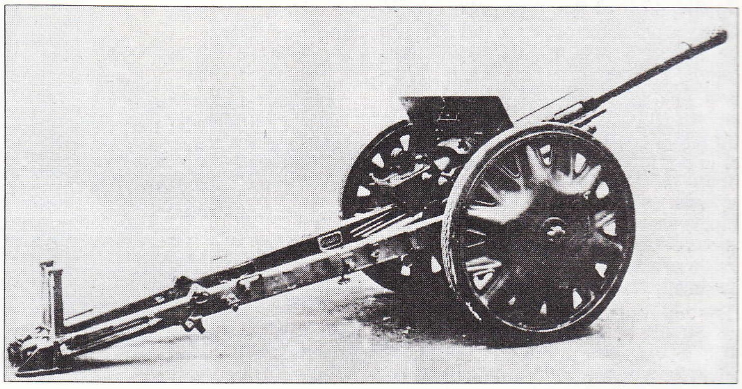
Cannone da 75/32 modello 37

When Italy emerged from World War I its economy, never particularly sound, was in no state to support a rearmament programme, and thus the weapons of World War I were bulked out by reparations from the Austro-Hungarian Empire, and the army was otherwise left to cope with what it already had. By the 1930s even the large numbers of weapons at hand were seen to be no real answer to more modern designs, so a programme of new weapon design was undertaken. The first weapons to be considered were those of the field artillery, and thus the first post-war artillery design to be introduced since 1918 was a field gun, the **Cannone da 75/32 modello 37**.

This new gun was an Ansaldo design. It was a good, sound and modern idea that was intended from the outset for powered traction, it had a long barrel fitted with a muzzle brake, and had a high enough muzzle velocity that it could be usefully employed on occasion as an anti-tank weapon. When the split trail was deployed it provided a traverse of 50°, which was no doubt useful in armoured warfare, but this was rather negated by the use of large trail spades that were hammered down into the ground through the trail legs, and thus a rapid change of traverse angle was not easy. Even with this slight disadvantage the modello 37 was a very useful field gun and the Italian gunners clamoured for as many as they could get.

Unfortunately they clamoured in vain, for Italian industry was in no position to provide the numbers required. There was quite simply no industrial potential to spare to produce the guns and all the raw materials, or at least the bulk of them, had to be imported. Thus gun production had to get under way at a time when all other arms of the Italian forces were in the process of re-armament; the air force was given a far higher degree of priority than the artillery, and the Italian navy was also absorbing a large proportion of the few available manufacturing and raw material resources. So demand for the modello 37 constantly exceeded supply, and by 1943 most of the Italian artillery park was still made up of weapons that dated from World War I or even earlier.

In 1943 the Italians changed sides. The Germans had already noted the finer points of the modello 37 and as the Italian nation withdrew from the Axis the Germans swiftly moved in to take over the Italian armoury, or at least as much of it as they could lay their hands on. In this grab for possession large numbers of modello 37s on the Italian mainland changed their designation to **7.5-cm FK 248(i)**. The Germans used their booty until the war ended, not only in Italy but also in the confused campaigns against Yugoslav partisan forces.



The Cannone da 75/32 modello 37 was another Ansaldo design, and was a good modern weapon that could stand comparison with any of its contemporaries. Its main fault for the Italian army was that there was never enough of them. After 1943 the Germans took over as many as they could find for their own use.

Specification
Cannone da 75/32 modello 37
Calibre: 75 mm (2.95 in)
Length of piece: 2.574 m (101.3 in)
Weight: travelling 1250 kg (2,756 lb) and in action 1200 kg (2,646 lb)
Elevation: −10° to +45°
Traverse: 50°
Muzzle velocity: 624 m (2,050 ft) per second
Range: 12500 m (13,675 yards)
Shell weight: 6.3 kg (13.9 lb)

CZECHOSLOVAKIA

Skoda 76.5-mm kanon vz 30 and 100-mm houfnice vz 30

When the Austro-Hungarian Empire vanished in the aftermath of World War I, the new state of Czechoslovakia was left with the huge Skoda arms manufacturing complex at Pilsen. Consequently the Czech state became a major supplier of all manner of arms to the Central European nations, but in the years after 1919 the arms market was still sated with the residue of World War I. The only way to break into the market was to offer something that was not already in the market and by 1928 the Skoda gun designers decided that they had found such a breakthrough.

What the Skoda designers discovered was that there was a definite market for a gun that could be all things to all men. Their suggestion was for a field gun with a high angle of barrel elevation that would enable it to be used as an anti-aircraft gun, or as an alternative act as a useful mountain gun. At that time the limitations imposed by the requirements of the anti-aircraft weapon were still not fully appreciated so the new Skoda proposal met with some interest. The new weapon was produced in two forms, one as a 75-mm (2.95-in) field gun/anti-aircraft gun and the other as a 100-mm (3.93-in) howitzer that could be used in a mountain role.

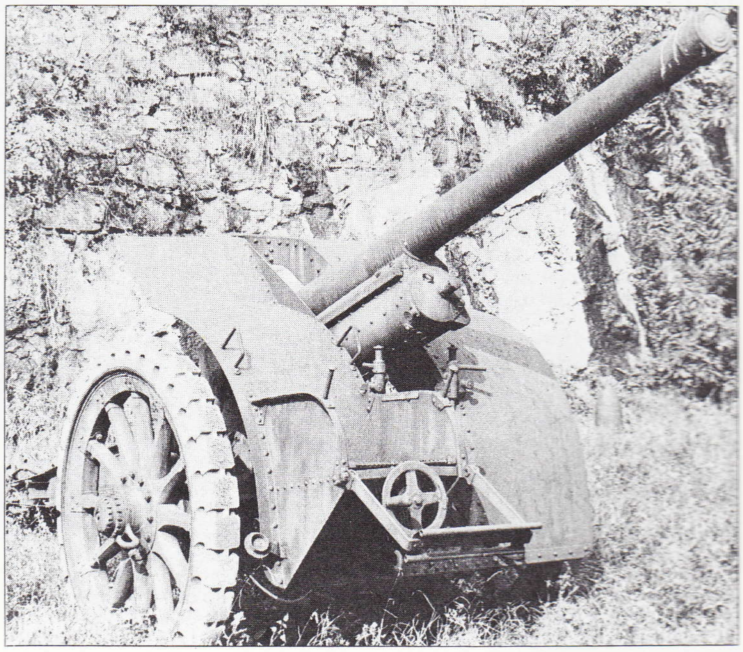
The first two weapons of this type were known as the **75-mm kanon vz 28** (*vzor*, or model) and **100-mm vz 28** as they were produced during 1928. Both types found ready markets in Yugoslavia and in Romania. Both weapons used a conventional enough carriage in appearance but what was not immediately obvious was that the barrel could be elevated to an angle of +80°. A firing table could be placed under the spoked wheel carriage enabling the barrel to be traversed rapidly in order to follow aerial targets. Needless to say the performance of the guns against aircraft targets was less than satisfactory for by the late 1920s it was formally being recognized that there was more to anti-aircraft firing than merely pointing a muzzle skywards; but as a field and mountain gun the vz 28 weapons were more than adequate and the anti-aircraft role was dropped. Instead the multi-role feature was emphasized by making the carriage easy to dismantle into three loads that could be carried on three horse-drawn carts for the mountain warfare role.

In 1930 the Czech army decided to adopt the two Skoda weapons as their vz 30 guns. The main change from the export models was that the calibre of the gun was altered to 76.5 mm (3.01 in) to suit the standard Czech calibre requirements, resulting in the **76.5-mm kanon vz 30**. The **100-mm houfnice vz 30** was fitted with a new pattern of rubber-tyred wheels and the result was a more than adequate field gun and howitzer combination to arm the field batteries of the Czech army.

These weapons never got a chance to prove their worth in Czech hands. The events of 1938 and 1939 meant that the Germans were able to take over the large Czech army gun parks and the assets of the Skoda complex at Pilsen without a shot being fired. All the Czech guns and the bulk of the various export models eventually found their way into German army service and Skoda was forced to supply ammunition, spares and even more guns for German army requirements. In German service the **7.65-cm FK 30(t)** guns and **10-cm leFH 30(t)** howitzers were used by all manner of units from front-line batteries to beach defence positions on the Atlantic Wall. They provided excellent service wherever they were, but not as anti-aircraft guns.

Specification
76.5-mm vz 30
Calibre: 76.5 mm (3.01 in)
Length of piece: 3.606 m (120.47 in)
Weight: travelling 2977 kg (6,564 lb) and in action 1816 kg (4,004 lb)
Elevation: −8° to +80°
Traverse: 8°
Muzzle velocity: 600 m (1,968 ft) per second
Range: 13505 m (14,770 yards)
Shell weight: 8 kg (17.64 lb)

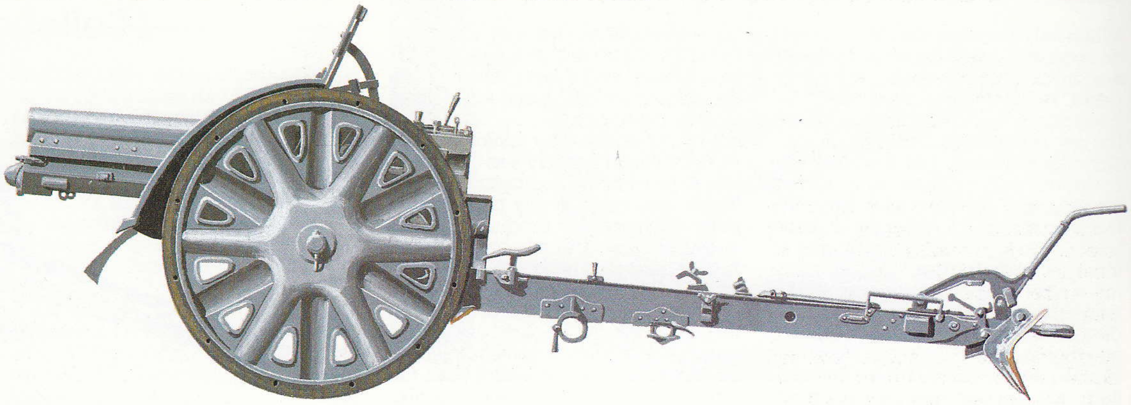
Specification
100-mm vz 30
Calibre: 100 mm (3.93 in)
Length of piece: 2.5 m (98.4 in)
Weight: travelling 3077 kg (6,785 lb) and in action 1766 kg (3,894 lb)
Elevation: −8° to +80°
Traverse: 8°
Muzzle velocity: 430 m (1,410 ft) per second
Range: 16000 m (17,500 yards)
Shell weight: 16 kg (35.28 lb)



The Skoda 76.5 mm kanon vz 30 was an attempt to produce a field gun with enough barrel elevation for it to be used as an anti-aircraft gun. While it was a sound enough field gun, it proved to be of little use as an anti-aircraft weapon, but the type was used by the Czechoslovak and other armies.

CZECHOSLOVAKIA

Skoda 100-mm houfnice vz 14 and houfnice vz 14/19



The Skoda 100-mm houfnice vz 14 was one of the better field weapons of the old Austro-Hungarian Empire during World War I, and went on to serve with many armies in World War II. By then it had been updated to the vz 14/19 standard by several modifications.

In the days of the Austro-Hungarian Empire the name of Skoda ranked only to that of Krupp in European armaments manufacture, and many of the old European nations armed themselves almost entirely with weapons produced at the massive Skoda works at Pilsen. By 1914 Skoda's designs were as good as any produced anywhere, and the range of weapon products was greater than most as Skoda also specialized in mountain guns. One of its products was a 100-mm (3.93-in) mountain howitzer mounted on a special carriage that could be broken down into loads for carrying over difficult terrain, and this weapon attracted the attention of many armies. Unfortunately they did not like the idea of the special carriage which was heavier than many would want for field artillery use so a new field carriage was produced. This was the **100-mm houfnice vz 14**.

The vz 14 was destined to be used mainly by the Italian army, which received large numbers in the upheavals of the break-up of the empire in 1918 and 1919. The type became a standard weapon for the Italians as the **Obice da 100/17 modello 14**, and was still in service in 1940 in large numbers. The numbers involved were so large that the Italians produced their own spare parts and ammunition. The type saw action in North Africa and served with Italian units on the Eastern Front alongside the Germans. But in 1943 the Italians withdrew from the conflict and their modello 14 howitzers were taken over by the German forces and remained in use until 1945 under the designation **10-cm leFH 315 (i)**, supplementing similar weapons taken over from the Austrians as the **10-cm leFH 14(ö)**. The type was also in service with the Polish and Romanian armies.

When Skoda resumed production for its new Czech owners the vz 14 was one of the first weapons placed back into production. However, the opportunity was taken to modernize the design, the main change being to the barrel length which was increased from 19 calibres (L/19) to 24 calibres (L/24), i.e. the length of the barrel was increased to 24 times that of the calibre (100 mm×24 for 2400 mm/7ft 10.5 in). This improved the range, and new ammunition was also introduced to provide the new design, soon known as the **100-mm houfnice vz 14/19**, with an improved all-round performance.

The vz 14/19 was soon in demand and numbers were exported to Greece, Hungary, Poland (**Haubica wz 1914/1919**) and Yugoslavia (**M.1914/19**). Italy also acquired the parts to modernize a proportion of its modello 14s and the Czech army also adopted the vz 14/19 as one of its standard field pieces. All in all the vz 14/19 became one of the most important Central European field pieces, and by 1939 the howitzer was in service in numbers that ran into the thousands. It was a stout weapon with few design frills and it was capable of prolonged hard use. Many Italian examples were fitted with rubber-tyred wheels for motor traction (**Obice da 100/24**) but even after 1939 many examples retained their original spoked wheels and were pulled into action by horse teams.

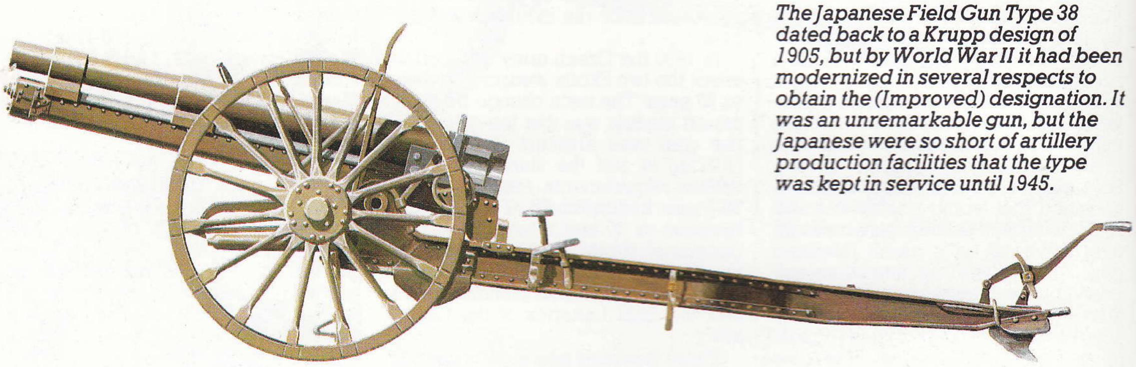
After 1940 many vz 14/19s passed into German army service. The Czech army stocks had by then already passed into German hands as a result of the take-overs of 1938 and 1939 and the vz 14/19 was widely used during the French campaign of May-June 1940 as the **10-cm leFH 14/19(t)**. Many more were used during the initial stages of the invasion of the Soviet Union during 1941 but thereafter the vz 14/19s were gradually relegated to second-line use and many were incorporated into the Atlantic Wall defences where they remained until 1945. Examples taken over from Greece were **10-cm leFH 318(g)**, those from Poland 10-cm **leFH 14/19(p)** and those from Yugoslavia 10-cm **leFH 316(j)**.

Specification

100-mm vz 14/19
Calibre: 100 mm (3.93 in)
Length of piece: 2.40 m (94.5 in)
Weight: travelling 2025 kg (4,465 lb) and in action 1505 kg (3,318 lb)
Elevation: −7.5° to +48°
Traverse: 5.5°
Muzzle velocity: 415 m (1,362 ft) per second
Range: 9970 m (10,907 yards)
Shell weight: 14 kg (30.87 lb)

JAPAN

75-mm Field Gun Type 38 (Improved)



The Japanese Field Gun Type 38 dated back to a Krupp design of 1905, but by World War II it had been modernized in several respects to obtain the (Improved) designation. It was an unremarkable gun, but the Japanese were so short of artillery production facilities that the type was kept in service until 1945.

Field Gun Type 38 (Improved) was a title given by Western intelligence agencies to a field gun that was in widespread use with the Japanese field batteries between 1935 and 1945. The gun had its origins in a Krupp design that was obtained for licence production as far back as 1905. This was the original **Type 38**, and during World War I the Japanese had observed enough of artillery developments elsewhere to be able to make improvements to the original design.

Perhaps the most obvious of these Japanese innovations was the introduction of a form of box trail in place of the original Krupp pole trail. This innovation made possible extra elevation, and thus range was increased accordingly. Other alterations were made to alter the balance of the barrel on its cradle, and yet more minor changes were made to the recoil mechanism. Although the updated gun was given the full title Field Gun Type 38 (Improved) by the Allies, by 1941 few, if any, of the Type 38 guns had been left unmodified, so the extra terminology was superfluous.

Despite the changes introduced to the Type 38 by the Japanese, the overall design was unremarkable, and the overall performance was also unimpressive. Throughout its service life the gun was never adapted for vehicle traction, so horse or mule teams were used right up to 1945. In appearance the gun was archaic, and it was indeed a design relic of a former era, maintained in service as the Japanese were never able to develop the industrial potential to produce artillery in the amounts required. Although much more modern and powerful field guns (with calibres of 75 mm/2.95 in and upwards) were produced right up to the beginning of World War II, they were never produced in numbers sufficient to permit the replacement of the Type 38. Thus Japanese gunners were saddled with obsolete guns in default of anything else.

During the initial stages of the Japanese war against the Chinese during the 1930s the Type 38 proved more than adequate for all its required operational tasks, but once the Allies joined in the conflict after 1941 things were very different. Following initial easy successes, the Japanese gunners constantly found themselves outgunned by even small forces of Allied artillery, and in these circumstances the Type 38 did not shine. In fact the Type 38 became something of a liability for, being horse-drawn, it was easily rendered immobile by enemy action or terrain conditions and many precious Japanese guns were lost or knocked out simply because they could not be moved rapidly enough.

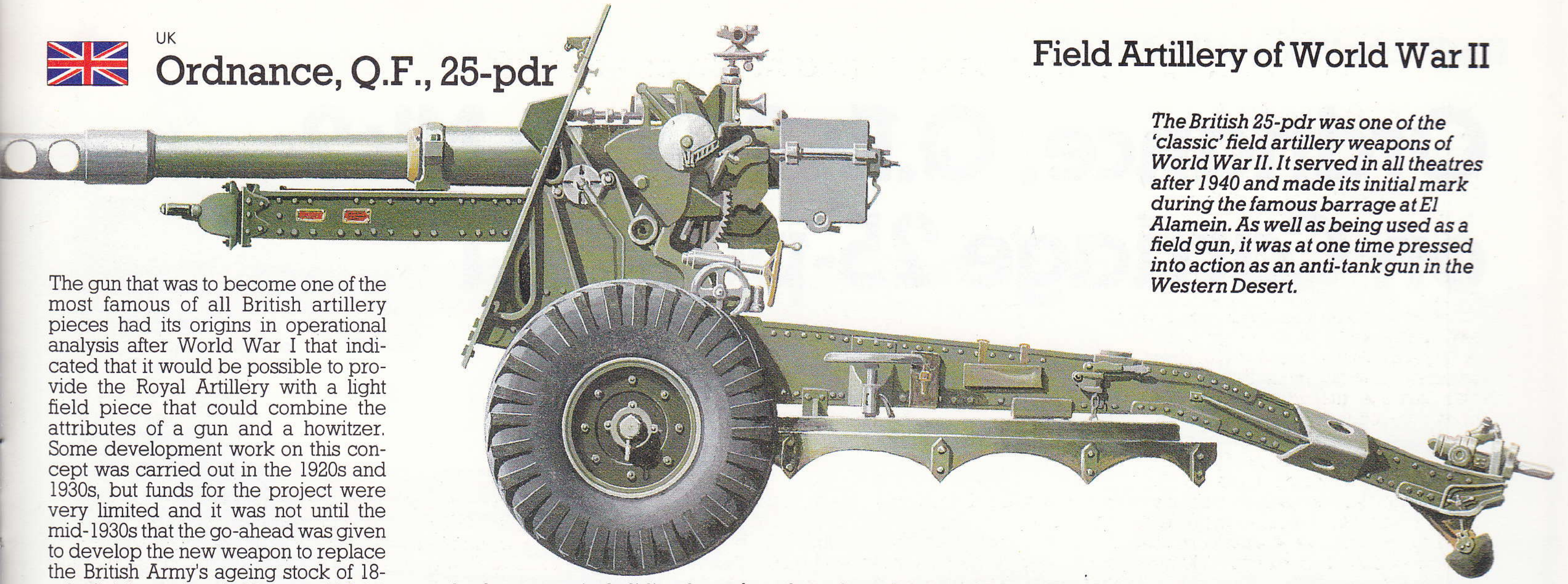
After 1945 quantities of Type 38 guns passed into the hands of various forces in South East Asia, some official and some unofficial, and there were reports of the weapon being used against French forces in Indo-China during the late 1940s.

Specification

Field Gun Type 38 (Improved)
Calibre: 75 mm (2.95 in)
Length of piece: 2.286 m (90 in)
Weight: travelling 1910 kg (4,211 lb) and in action 1136 kg (2,504 lb)
Elevation: −8° to +43°
Traverse: 7°
Muzzle velocity: 603 m (1,978 ft) per second
Range: 11970 m (13,080 yards)
Shell weight: 6.025 kg (13.3 lb)

UK

Ordnance, Q.F., 25-pdr



The British 25-pdr was one of the 'classic' field artillery weapons of World War II. It served in all theatres after 1940 and made its initial mark during the famous barrage at El Alamein. As well as being used as a field gun, it was at one time pressed into action as an anti-tank gun in the Western Desert.

The gun that was to become one of the most famous of all British artillery pieces had its origins in operational analysis after World War I that indicated that it would be possible to provide the Royal Artillery with a light field piece that could combine the attributes of a gun and a howitzer. Some development work on this concept was carried out in the 1920s and 1930s, but funds for the project were very limited and it was not until the mid-1930s that the go-ahead was given to develop the new weapon to replace the British Army's ageing stock of 18-pdr field guns and 114-mm (4.5-in) howitzers.

Since there were large stocks of the old 18-pdr guns still around in the 1930s the Treasury dictated that some way would have to be found to use them. From this came the **Ordnance, Q.F., 25-pdr Mk 1**, which was a new barrel placed on an 18-pdr carriage, and it was with this gun that the BEF went to war in 1939. The old carriages had been updated with new pneumatic wheels and other changes (some even had split trails), but the 25-pdr Mk 1 had little chance to shine before most of them were lost at Dunkirk.

By then the **25-pdr Mk 2 on Carriage 25-pdr Mk 1** was on the scene. This was a purpose-built weapon that was intended to be the full replacement for the old pieces, and was among the first examples of what can now be described as a gun-howitzer. It used an ammunition system with variable charges but could be used for lower-register firing with no loss in efficiency. The barrel itself was orthodox and used a heavy vertical sliding breech mechanism, but the carriage had some unusual features. It was a humped box trail carried on a circular firing table that enabled one man to make large changes of traverse angle easily and quickly. The design was intended from the start for powered traction, the usual tractor being one of the large 'Quad' family.

Almost as soon as the first 25-pdr guns saw action in North Africa they were pressed into use as anti-tank guns. The little 2-pdr anti-tank gun proved to be useless against the Afrika Korps' tanks, and the 25-pdr had to be used as there was nothing else to hand. It was then that the circular firing table came into its own, for the guns could be rapidly moved from target to target, but the 25-pdr had to rely on shell power alone for its effects as there was no armour-piercing ammunition. Such a round was developed, but it entailed the use of an extra charge which in turn dicated the use of a muzzle brake, and in this form the 25-pdr was used throughout the rest of World War II.

Some changes were made to the carriage design to suit local requirements. A narrower version was developed for jungle and airborne warfare (**25-pdr Mk 2 on Carriage 25-pdr Mk 2**) and a version with a hinged trail (**25-pdr Mk 2 on Carriage 25-pdr Mk 3**) was produced to increase elevation for hill warfare. The Australians produced a drastic revision for pack transport, and there was even a naval version mooted at one time. The 25-pdr went 'self-propelled' in the Canadian Sexton carriage and there were numerous trial and experimental versions, one classic expedient being the stopgap mounting of 17-pdr anti-tank barrels on 25-pdr carriages. Captured examples were designated **8.76-cm FK 280(e)** by the Germans.

The 25-pdr provided sterling service wherever it was used. It had a useful range, and the gun and carriage proved capable of absorbing all manner of punishment and hard use. It remained in service with numerous armies for many years after 1945 and is still in service with many. The 25-pdr was one of those artillery pieces that will go down in history as a 'classic', and many gunners remember the weapon with what might almost be termed affection.

Specification

Ordnance, Q.F., 25-pdr Mk 2

Calibre: 87.6 mm (3.45 in)

Length of piece: 2.40 m (94.5 in)

Weight: travelling and in action 1800 kg (3,968 lb)

Elevation: −5° to +40°

Traverse: on carriage 8°

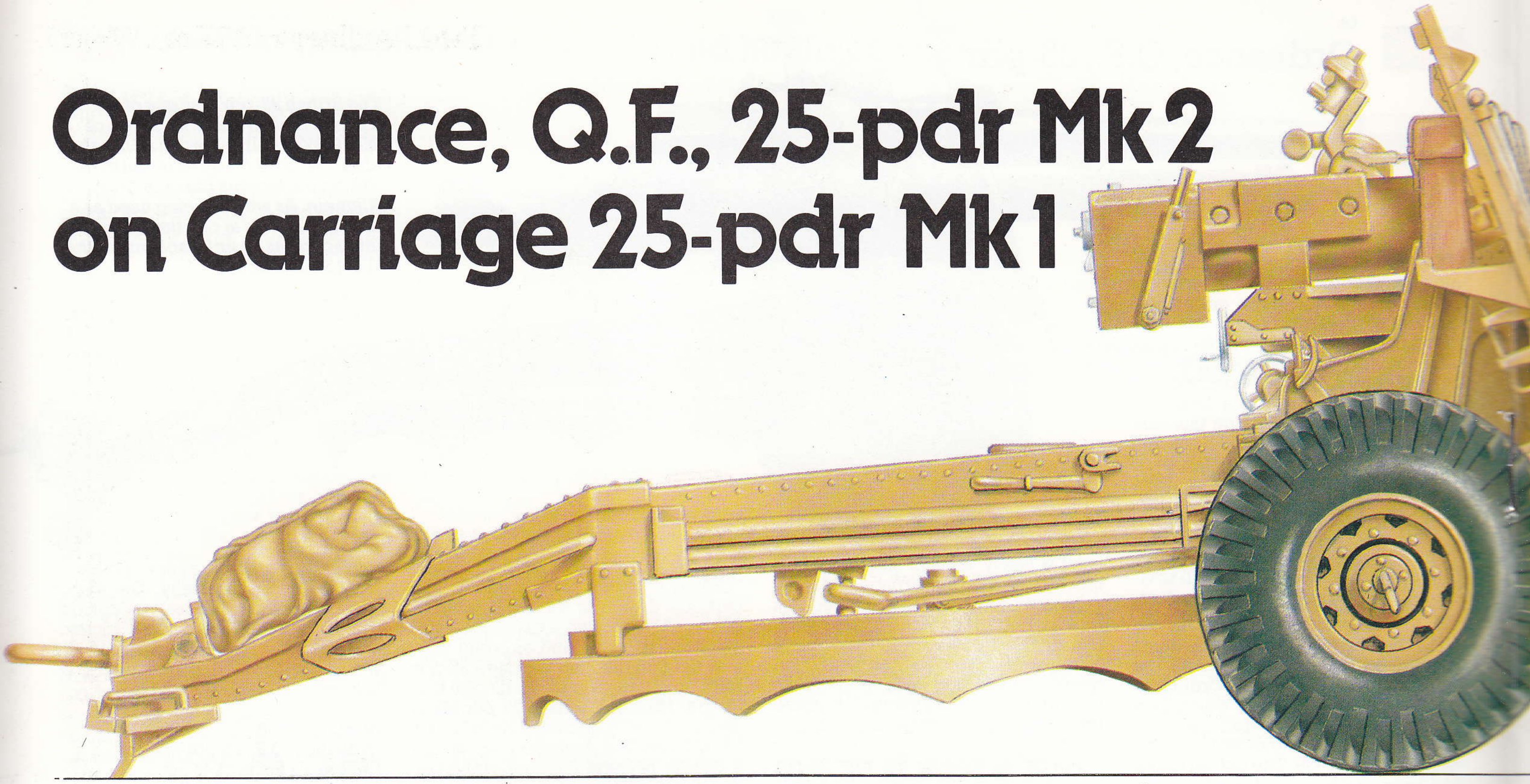
Muzzle velocity: 532 m (1,745 ft) per second

Range: 12253 m (13,400 yards)

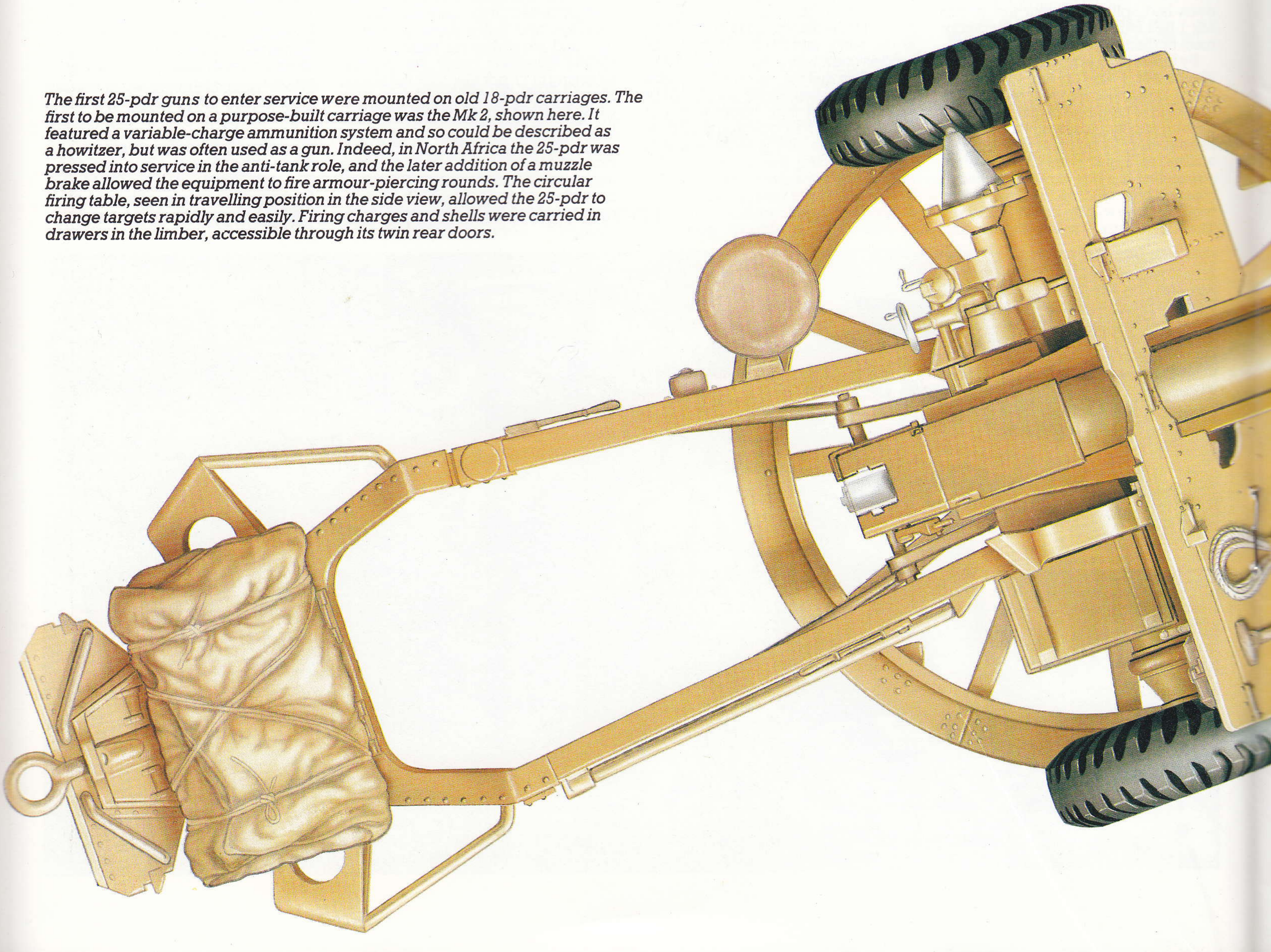
Shell weight: 11.34 kg (25 lb)

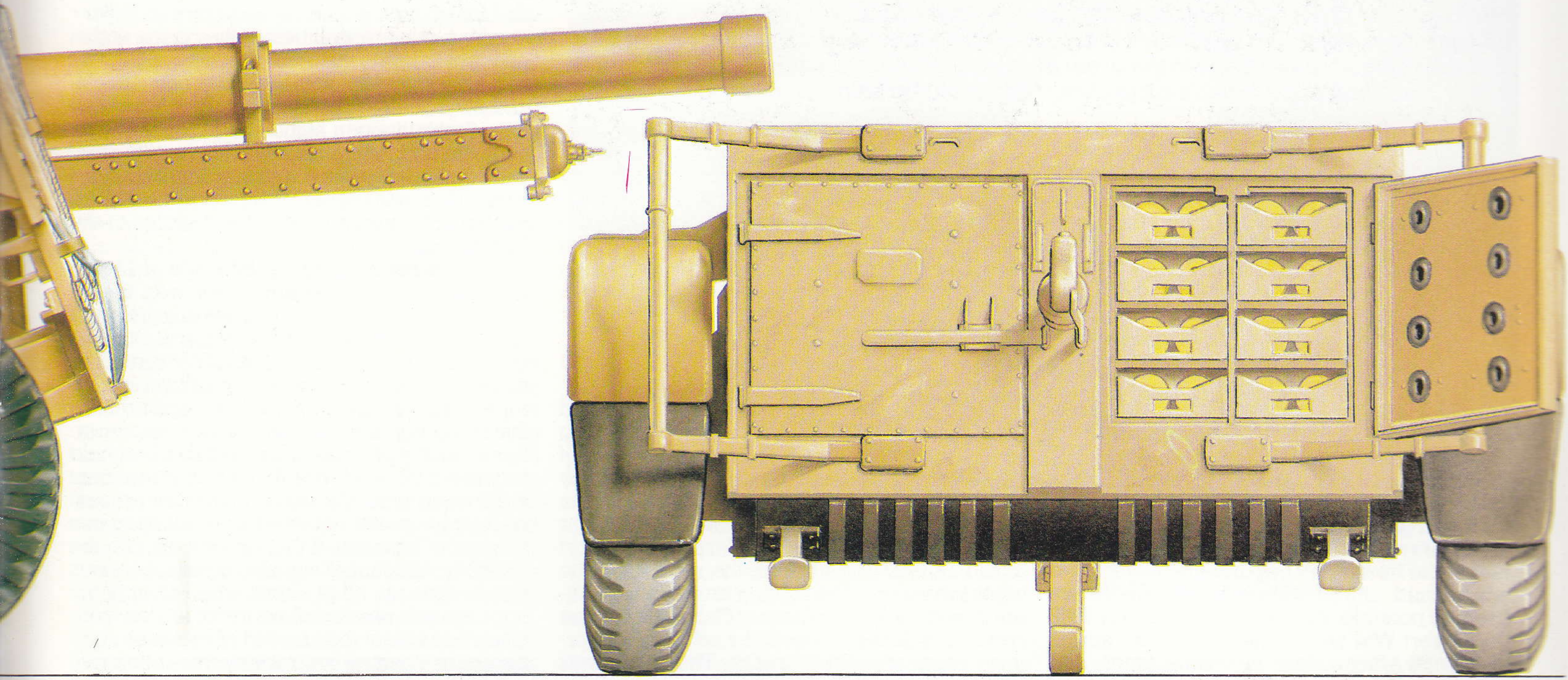
25-pdrs on a training range are manned by Canadian gunners, the 25-pdr being the standard field gun for many Commonwealth armies. This photograph probably dates from mid-1943.

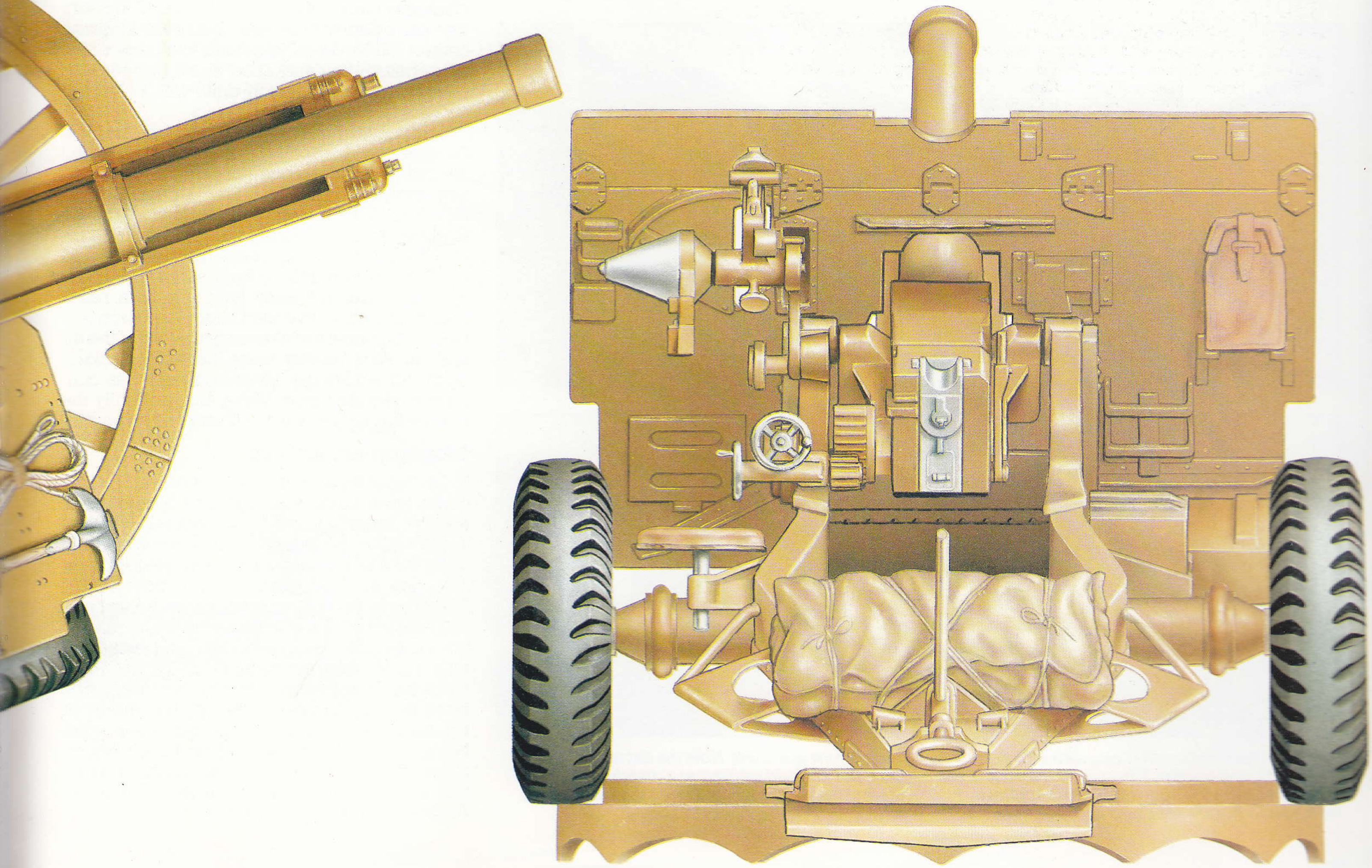
Ordnance, Q.F., 25-pdr Mk 2 on Carriage 25-pdr Mk 1



The first 25-pdr guns to enter service were mounted on old 18-pdr carriages. The first to be mounted on a purpose-built carriage was the Mk 2, shown here. It featured a variable-charge ammunition system and so could be described as a howitzer, but was often used as a gun. Indeed, in North Africa the 25-pdr was pressed into service in the anti-tank role, and the later addition of a muzzle brake allowed the equipment to fire armour-piercing rounds. The circular firing table, seen in travelling position in the side view, allowed the 25-pdr to change targets rapidly and easily. Firing charges and shells were carried in drawers in the limber, accessible through its twin rear doors.







British Artillery at El Alamein

The battles at El Alamein contrasted strongly with the fluid war of movement which had previously typified the Desert War. At Second Alamein, the battle of materiel which evolved harked back to the great battles of 25 years previously: as in the Great War, the artillery made a significant contribution to the conduct of the battle.

One of the least known facts regarding the battle now known familiarly as El Alamein is that there was not one battle but two. The first of these two battles was at one time known as the Battle of Ruweisat and took place on 7/8 July 1942, but this is now more generally known as the 1st Battle of El Alamein.

The battle took the form of a holding operation to keep the advancing Axis columns away from the vitally important stores and communications centres located along the Suez Canal and around Cairo. If the enemy was ever to get anywhere near those locations things would indeed have been very bad for the Allies, whose main problem was that they were fighting a holding operation after a long period of withdrawal in the face of an enemy who had learned to take every opportunity offered, and who would attack whenever a half-chance seemed possible. By the beginning of July 1942 the Desert War had swayed to and fro across the North African deserts several times, and again the German and Italian forces were on the winning streak. They had severely trounced a large Allied foray and forced the Allies back to an area where there was no room to the south for the usual Afrika Korps flanking move into the desert. The way to the south was barred by the impassable Qattara Depression and just to the north of this was the Ruweisat Ridge. El Alamein station, the halt that was to give history its name, was away to the north on the coastal railway line.

Fortunately for the Allies, the Germans and Italians were operating at the end of a very long logistic chain and were almost at the end of their operational tank strength. When they finally attacked the Ruweisat Ridge area the Allies were emplaced and were ready for them. Using whatever artillery fire support could be scraped up from the remains of the units involved in the fighting around the 'Cauldron' and after in the Battle of Gazala (May-June 1942), the Allies stopped the advancing German columns in their tracks. The action was notable for several factors. One was that it was the last time that British 25-pdr field guns had to be used in an anti-tank role, for after 1st El Alamein there were enough 6-pdr anti-tank guns on hand for the 25-pdr guns to revert to their proper field roles. These 25-pdr actions had always been desperate affairs. The 25-pdr guns were never meant for direct anti-tank actions and made large targets for the German and Italian tank gunner to engage with tank or machine-gun fire well before they came within effective range of the field guns. The gun crews had little cover other than the thin gun shield, and engagements had to be fought over what were virtually open sights. Under such conditions the odds were usually with the attacking tank crews and there were many occasions when all manner of heroic deeds were carried out fighting tanks almost to the muzzles of the 25-pdr guns.

Another reason why the 1st Battle of El Alamein should be remembered was that it marked the end of a period of relative disorganization within the Royal Artillery. Starting some time in 1941 the internal structure of the Royal Artillery had been considerably disrupted by a series of internal reorganizations that seriously affected its combat efficiency. For a variety of reasons well-established field regiments (to the Royal Artillery the regiment is the equivalent of a battalion in other armies) were split up and batteries were merged in a number of changes. If that was not enough the carefully structured signals organization was also broken up, all at a time when exactly the opposite was needed. A series of actions were taken that meant that instead of batteries coming under a central control they were often split up and sent off in ones and twos to carry out some form of local fire support. The results were not good. At times batteries stood idle when their fire was needed elsewhere. At other times single batteries had to bear the brunt of armoured attacks with no support from other batteries.

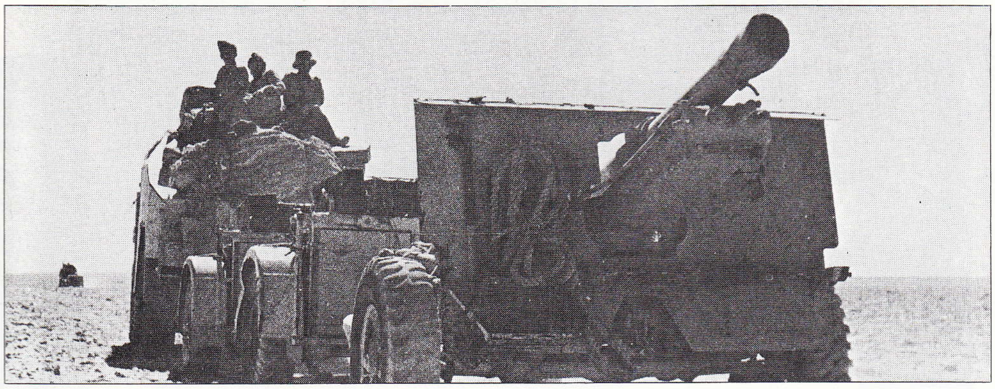
By the time of 1st El Alamein things were changing back. Once again the Royal Artillery was provided with its own form of centralized control. Batteries moved back to a tidier internal organization, and once again the chain of communication between units was being reformed.

Some time after his repulse at 1st El Alamein Rommel made another almost half-hearted attempt to break through once again at a location known as Alam el Halfa, but that too was repulsed. Things then settled down for more than two months. During that time the Italians and Germans resupplied themselves and brought up as much equipment as they could muster. It was not easy for them, as a result mainly of the fact that the Desert Air Force had begun its process of wresting mastery of the air and all Axis moves were heavily attacked. Shipping across the Mediterranean was constantly harassed from Malta, but gradually the enemy forces grew in numbers and strengths.

Montgomery arrives

On the Allied side a new commander had come upon the scene. Bernard Montgomery added his name to the list of generals who had commanded the Desert armies, but with a big difference as he was there to stay. He took over a motley and not particularly happy bunch. Many were raw newcomers to the Desert and its peculiar requirements. Many were straight out of the UK training schools and were still little more than civilians in uniform. Others were battle-hardened 'sweats' who had often been brutally misused either by the enemy or by their own commanders. But they were being constantly reinforced and new equipment was pouring into the Canal Zone. Among this new equipment were large quantities of American tanks and new guns.

A 25-pdr position within the Tobruk lines in early 1942. Despite the state of readiness of the gun crew, things must have been quiet to allow them to get their washing dry. This 25-pdr lacks the muzzle brake fitted to later models following the adoption of a special armour-piercing round.



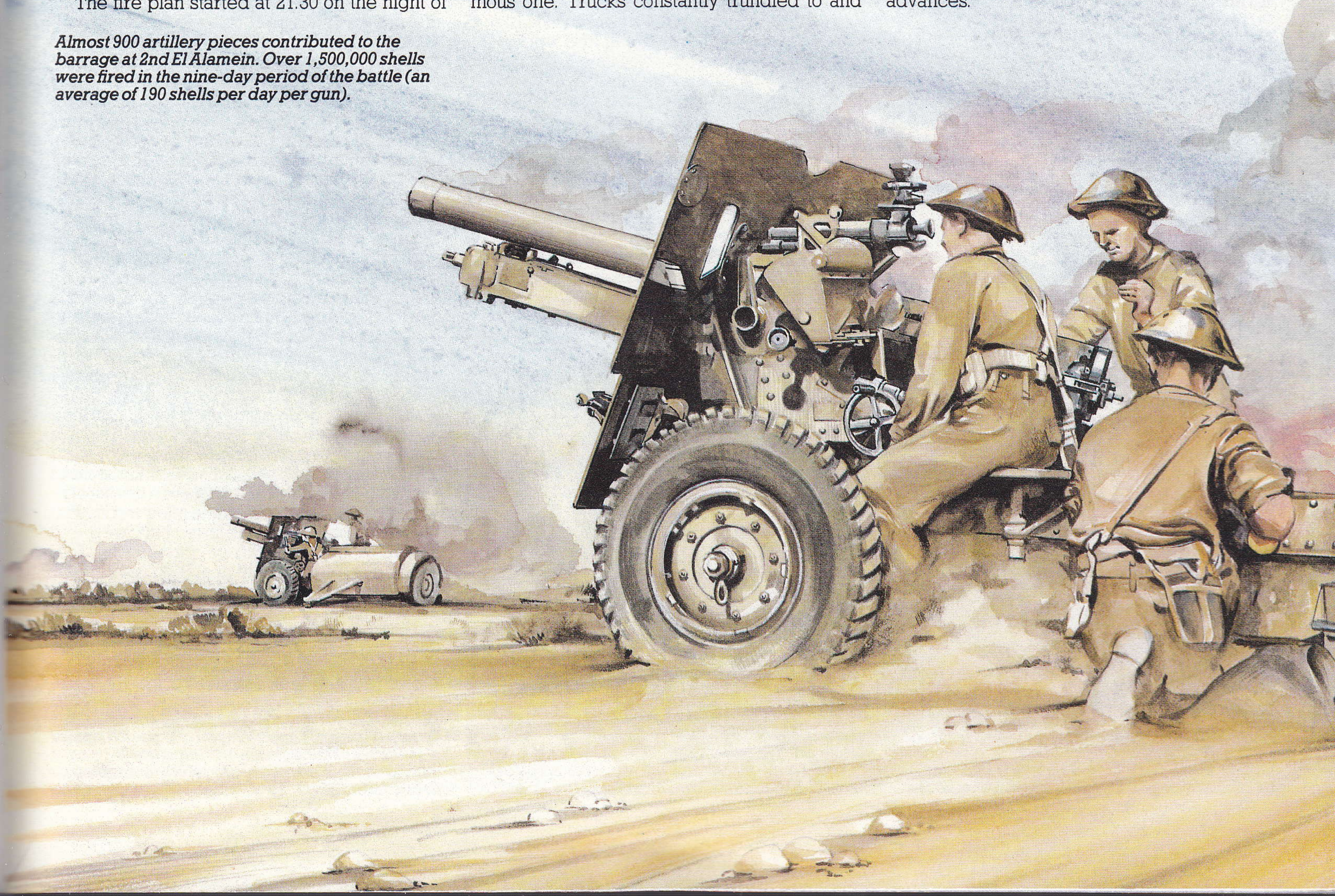
A typical Western Desert scene with a 25-pdr on tow by its Quad tractor. The gun crew on top of the Quad are not only taking the air but keeping a watch for Luftwaffe attackers as the guns moves back to new positions. Note the flat terrain that often put the field artillery at a disadvantage against tanks, especially during the long retreat from Tobruk to the Alamein line.

A 25-pdr fires at night, probably during the El Alamein barrage when 834 25-pdrs fired away throughout the night of 23 October 1942, making the sky light with their gun flashes.

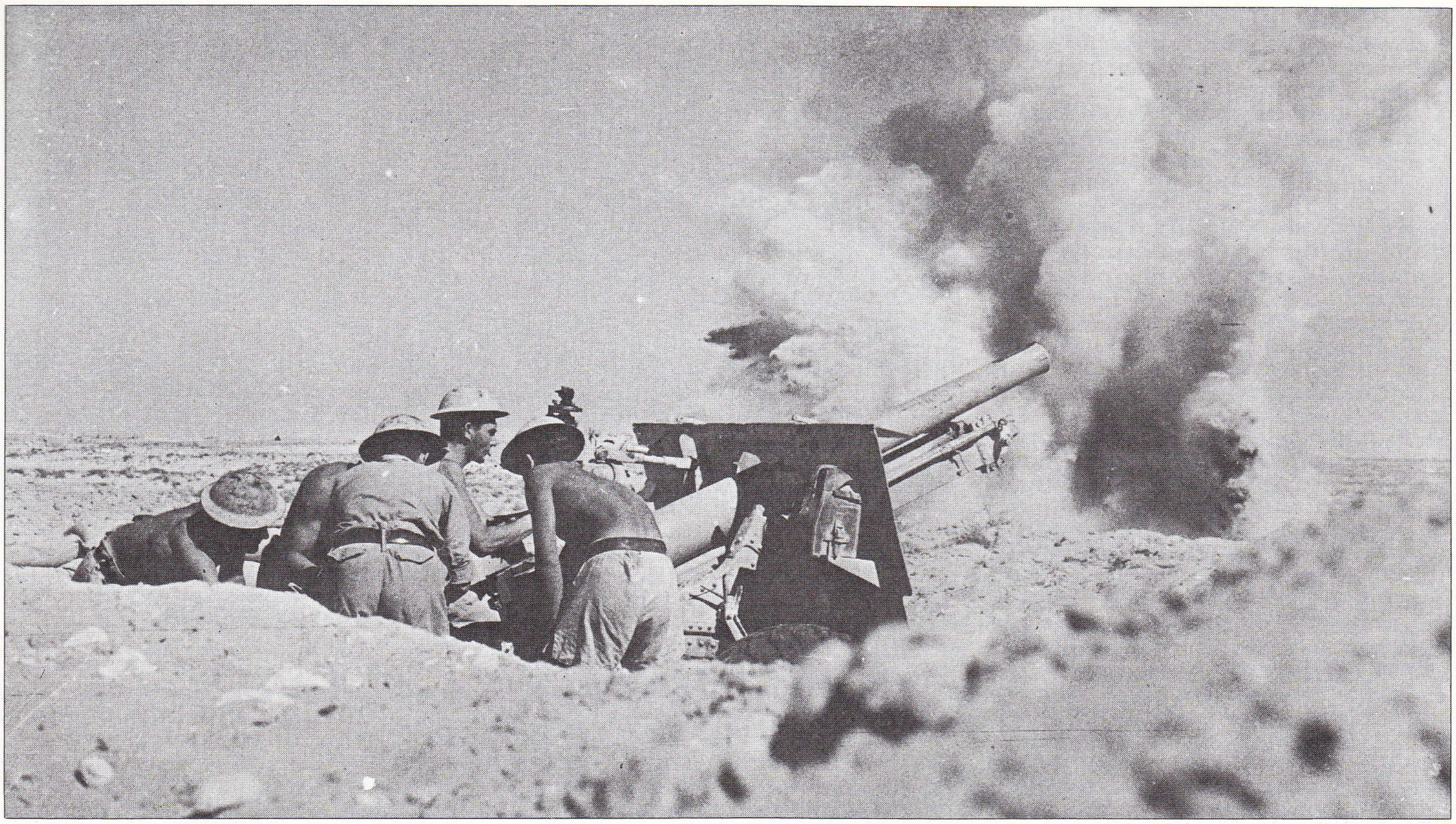
Montgomery had two tasks to perform. One was to prepare physically for battle and the other was to put heart into his men and prepare them for what was to come. He realized a fact that is now sometimes forgotten, for military history has often chosen to overlook it, and that was that his forces could not fight the German and Italians at their own game. There was no chance that the bulk of his raw forces would be able to use their initiative and shock abilities in the way that Rommel constantly achieved with his forces. Things would have to proceed at a steady pace, with everything under total control at all times. The Allied forces were by late 1942 far in excess of their Axis counterparts in numbers, and it was evident that they would win through in the end, but it all had to be carried out under a rigid and steady controlling hand. Thus there was no talk at that time of armoured breakthroughs, or of rapid advances to the west. Instead there was talk of careful preparation, steady advances and a steady move through the enemy positions. These were all terms from World War I, and indeed the 2nd Battle of El Alamein has frequently been likened to a 'Great War' battle brought up to date; this was not the result of an old philosophy but rather of the materials to hand.

In true World War I style the battle was to open with a barrage. Involved in the barrage planning were no fewer than 834 25-pdr guns and a grouping of 48 assorted heavier guns. A careful fire plan was to open the Axis positions, by that time protected by belts of land mines and barbed wire, and was initially used to cover the activities of sapper parties who were to clear a way through the obstacles.

The fire plan started at 21.30 on the night of 23 October 1942. At the time it was the largest of its kind since 1918 and it attracted a great deal of publicity and did a great deal to raise Allied morale. Not all the guns were involved at any one time. The usual number involved was rarely more than 480 guns, for the gun crews had to stand ready to switch fire to new targets and prepare ammunition for the next part of the fire plan. The amount of ammunition expended was prodigious. A later estimate put the number of shells fired at well over one and a half million, which may sound a lot now but by pre-1918 standards was all pretty small beer. The ammunition supply problem was an enormous one. Trucks constantly trundled to and from the ammunition dumps in the Canal Zone area and from the forward supply locations placed farther forward. To confuse enemy reconnaissance aircraft that got through the Desert Air Force defensive screen, a number of dummy dumps and batteries were set up in various locations, mainly well away from the main intended point of the anticipated advances.



Almost 900 artillery pieces contributed to the barrage at 2nd El Alamein. Over 1,500,000 shells were fired in the nine-day period of the battle (an average of 190 shells per day per gun).



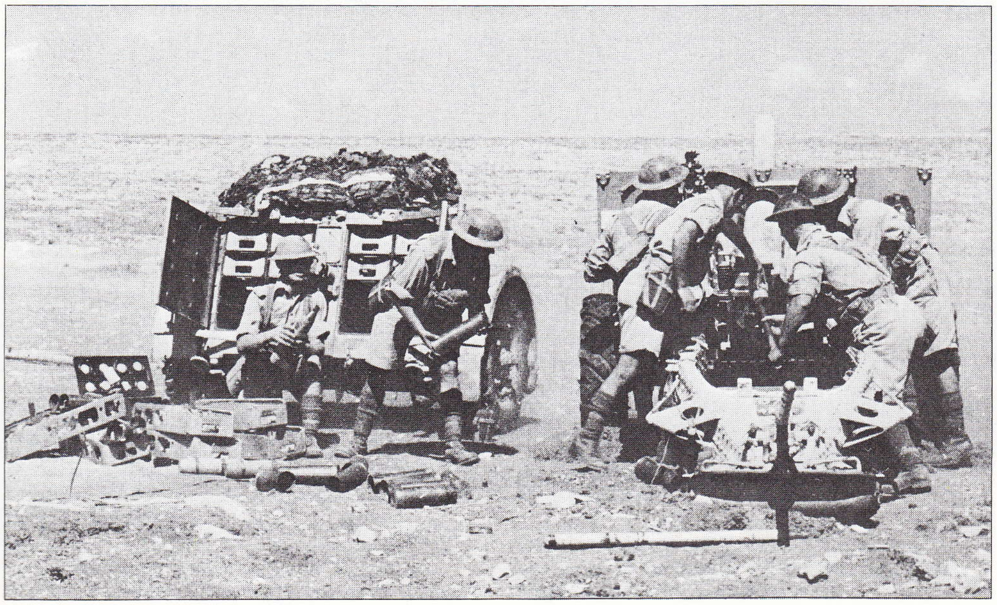
In battle, artillery often provided indirect fire, from out of sight of the target. In such cases the only way to respond is with counter-battery fire. Here German or Italian shell bursts close to a 25-pdr crew in action, without causing any interruption.

One of the principal reasons for the success of the El Alamein barrage was that it was carried out under the central control of the Royal Artillery itself. For the first time in a long period the gunners were able to carry out their own plans and fire missions using their own centralized chain of command. An artillery adviser was on hand at all command levels from division to corps as the fighting swung to and fro during the nine days that marked the progress of 2nd El Alamein. Montgomery constantly switched the point of attack from one location to another, constantly keeping the enemy on guard until the final thrust to allow XXX Corps to make the final breakthrough.

Once the breakthrough was made the Allied pursuit moved forward, but not at a breakneck pace. The 8th Army staff was only too aware that a headlong rush by its eager but still ill-trained forces would probably be met with a fierce countermove by Rommel's seasoned forces, and that any such knock would probably stop the whole operation in its tracks. Instead Montgomery allowed his forces to move forward in strict limits, with each move covered by plenty of artillery fire support. The 'pursuit' began in earnest on 3 November 1942 and did not cease until the approaches to Tunisia, by which time the Allies were well in command. As they advanced through the wreckage of the old Desert battlefields the 8th Army and its allies heard the news that an Anglo-American force had landed in Morocco and Algeria on 8 November, so the Axis troops then had to contemplate a battle in their rear.

With the breakout from the El Alamein battlefield the gunners were able to advance at the same rate as their 'customer' formations. Using their Quad and other tractors, the 25-pdr guns moved forward to resume their intended role once more. No more did they have to contemplate slugging it out with advancing enemy tanks and no more did they have to endure being separated from their 'home' organizations and structures when they were ordered to provide fire support for some hastily lashed together string of combat vehicles. They were moving forward to carry out their operational task under proper control, and at a pace well within their capabilities.

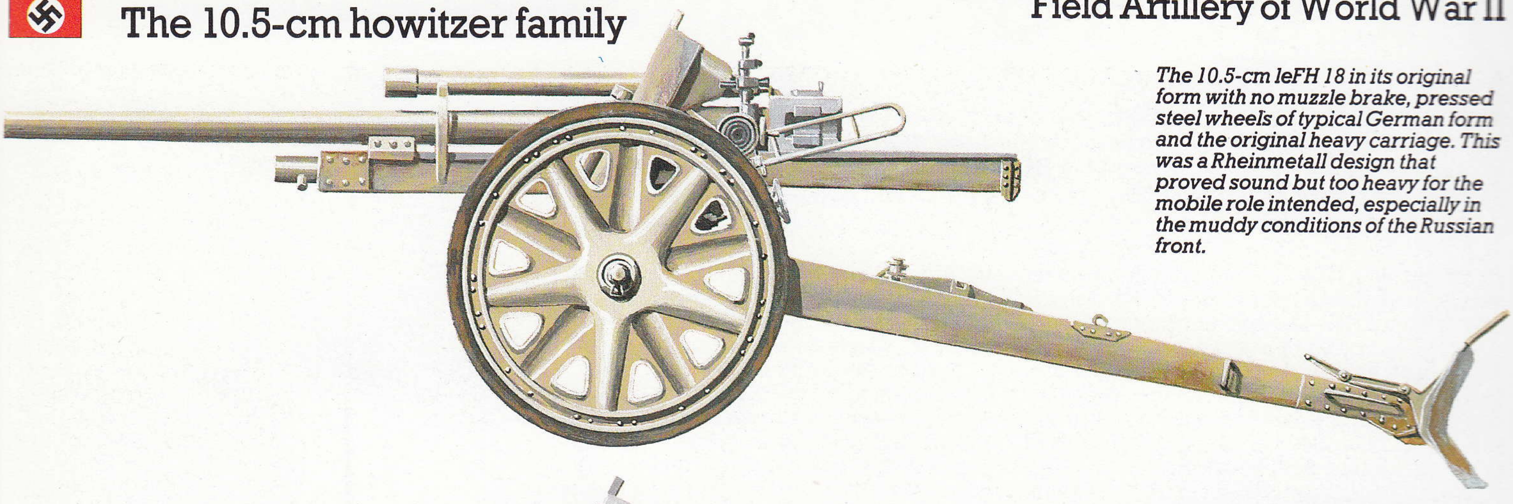
Of course it was not all like that in the days following 2nd El Alamein, and even the carefully planned course of the battle often went awry, but the gunners played their part well and made the eventual victory certain. The Axis forces were completely unable to match their Allied gunner counterparts throughout the battle, and at 2nd El Alamein the more far-sighted of them must have realized that they were witnessing the beginning of the end.



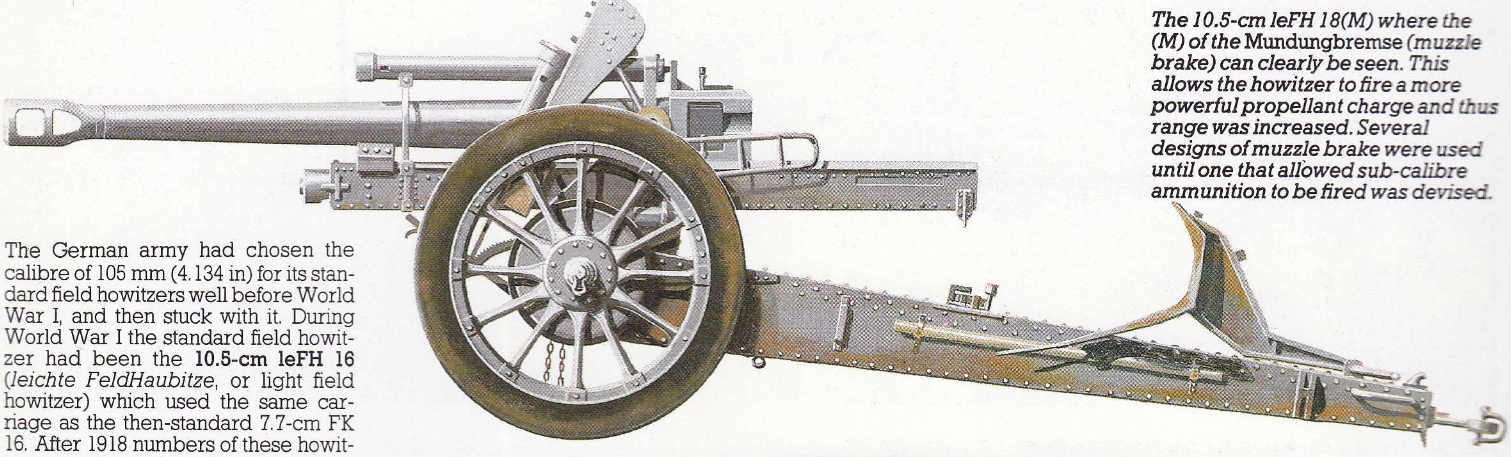
The six-man crew of a 25-pdr carries out its tasks. Two men are handling ammunition, the gunlayer is making use of the sights on the left of the gunshield. This is an early model of the weapon, dating from 1941.

GERMANY

The 10.5-cm howitzer family



The 10.5-cm leFH 18 in its original form with no muzzle brake, pressed steel wheels of typical German form and the original heavy carriage. This was a Rheinmetall design that proved sound but too heavy for the mobile role intended, especially in the muddy conditions of the Russian front.



The 10.5-cm leFH 18(M) where the (M) of the Mundungbremse *(muzzle brake) can clearly be seen. This allows the howitzer to fire a more powerful propellant charge and thus range was increased. Several designs of muzzle brake were used until one that allowed sub-calibre ammunition to be fired was devised.*

The German army had chosen the calibre of 105 mm (4.134 in) for its standard field howitzers well before World War I, and then stuck with it. During World War I the standard field howitzer had been the **10.5-cm leFH 16** (*leichte FeldHaubitze*, or light field howitzer) which used the same carriage as the then-standard 7.7-cm FK 16. After 1918 numbers of these howitzers remained with the rump of the German army and were used to train the generation of gunners who were to be the battery commanders and NCOs of World War II.

The operational analysis carried out by German war planners during the 1920s indicated that in future conflicts a 105-mm (4.13-in) projectile would be far more effective than the 75-mm (2.95-in) equivalent for no great cost in delivery system weight, that is the artillery piece involved. Thus they plumped for a new 105-mm (4.13-in) howitzer, and design work started as early as 1928-9. Rheinmetall was the project leader, and the result of its efforts was ready for service in 1935.

The new weapon was the **10.5-cm leFH 18**, a conventional and sound howitzer with a useful projectile weight and adequate range. If there was a fault with the leFH 18 it was that it was so soundly constructed that it was rather heavy, but as motor traction was expected to provide the bulk of the pulling power that was no great disadvantage, at least in theory. The leFH 18 became a valuable export item, and numbers were sold to Spain, Hungary, Portugal and some South American nations; large numbers also came off the production lines to equip the expanding German forces.

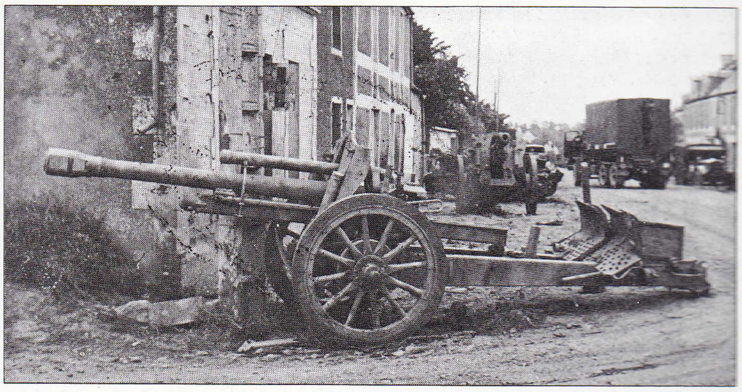
As ever the gunners were soon asking for more range, and as a result an increased propellant charge was introduced for the leFH 18. This dictated the introduction of a muzzle brake which meant a change of designation to **10.5-cm leFH 18(M),** the suffix denoting *Mundungbremse*, or muzzle brake. The introduction of this muzzle attachment meant that a special sabot sub-calibre 88-mm (3.46-in) projectile could not be fired until a new revised design was introduced slightly later.

Thus the leFH 18 series went to war and proved itself efficient enough until the winter campaign in the Soviet Union took its toll in 1941-2. During the thaws involved in that campaign large numbers of 105-mm (4.13-in) howitzers were lost because the weights involved were too great for the available towing vehicles to drag weapons clear of the all-prevailing mud. Thus the overweight howitzers showed their disadvantage with a vengeance, and a hurried search for some form of alternative carriage then began.

The result was an unsatisfactory improvisation. The carriage of the 7.5-cm Pak 40 anti-tank gun was simply taken as the new mount for the leFH 18(M) gun, its associated cradle and the large shield. The result was slightly lighter than the original (but not by very much), and the improvised arrangement gave constant problems that were never properly eradicated. It was intended that the new howitzer/carriage combination, designated **10.5-cm leFH 18/40**, would become the standard field howitzer for all the German army, but this never happened and in 1945 even the old FH 16 was still in the line.

Specification

10.5-cm leFH 18/40
Calibre: 105 mm (4.134 in)
Length of piece: 3.31 m (130.23 in)
Weight: travelling and in action 1955 kg (4,310 lb)
Elevation: −5° to +42°
Traverse: 60°
Muzzle velocity: 540 m (1,770 ft) per second
Range: 12325 m (13,478 yards)
Shell weight: 14.81 kg (32.65 lb)



Above: Abandoned 10.5-cm leFH 18(M) howitzers in Normandy in June 1944. Note the obvious bulk and weight of the trail legs and spades that combined to make this howitzer too heavy for the mobile field role.

Below: 10.5-cm leFH 18s in action in France during May 1940 when these howitzers, towed into action by half-tracks, consistently outfought the more numerous French artillery units as they swept across France.

The German 105-mm Howitzers

Following defeat in 1918, the Wehrmacht in its analysis of field artillery performance came to the conclusion that the heavier shell and high elevation of the howitzer would contribute most to the evolving Blitzkrieg theory. Hence, in the invasion of Poland the standard field artillery piece was a 105-mm howitzer.

By World War I the 105-mm (4.13-in) howitzer was an established component of the German field artillery. The German gunners found that the 105-mm (4.13-in) projectile carried a useful destructive payload and that the weight of projectiles and charges was not too great for manual handling, which was all that was available in the field. By 1918 the most widely used of all the German field howitzers was the 10.5-cm leichte Feldhaubitze 16 (10.5-cm leFH 16) based on the same carriage as the 7.7-cm FK 16 field gun.

After 1918 some of these German howitzers were passed to Belgium as war reparations, but many remained in German army hands to form the training weapons for the 'new' German army that was gradually formed during the 1920s and early 1930s. Many German gunners of World War II had their initial training on the leFH 16 so it always had a place in their outlook. After 1940 many of the old leFH 16s were relegated to places in the Atlantic Wall, where they acted as beach-defence weapons.

Good as the leFH 16 was, the German staff planners realized that something better would be required in the long term, so during the late 1920s Rheinmetall-Borsig was requested to go ahead with a new design of 105-mm (4.13-in) howitzer for field service. By 1929 initial design studies were complete, but it was not until 1933 that a prototype was ready for firing trials. The new design was adopted by the German army in 1935, and thereafter, known as the 10.5-cm leFh 18, was the main component of the German army field batteries until 1945.

By the 1930s the German army favoured the howitzer over the gun for its field artillery batteries. The operational analysis that followed World War I indicated to the German army that the high-angle fire and the heavier projectile of the howitzer were far more effective in the type of campaign that they expected to fight in any future conflict, despite the range attractions of the field gun. Thus the German army invested heavily in field howitzers, and decided to standardize as far as possible on the leFH 18.

The leFH 18 in its initial form was a heavy but well-constructed howitzer. Intended to be towed by motorized tractors, it had large steel wheels with solid rubber rims and heavy split box trails. The breech was of the usual German sliding block variety, and a shield was normally fitted. The weight of the barrel and carriage made the leFH 18 a very stable weapon in action, where it had a capability against armoured targets although that type of target had not originally been considered in the design stage.

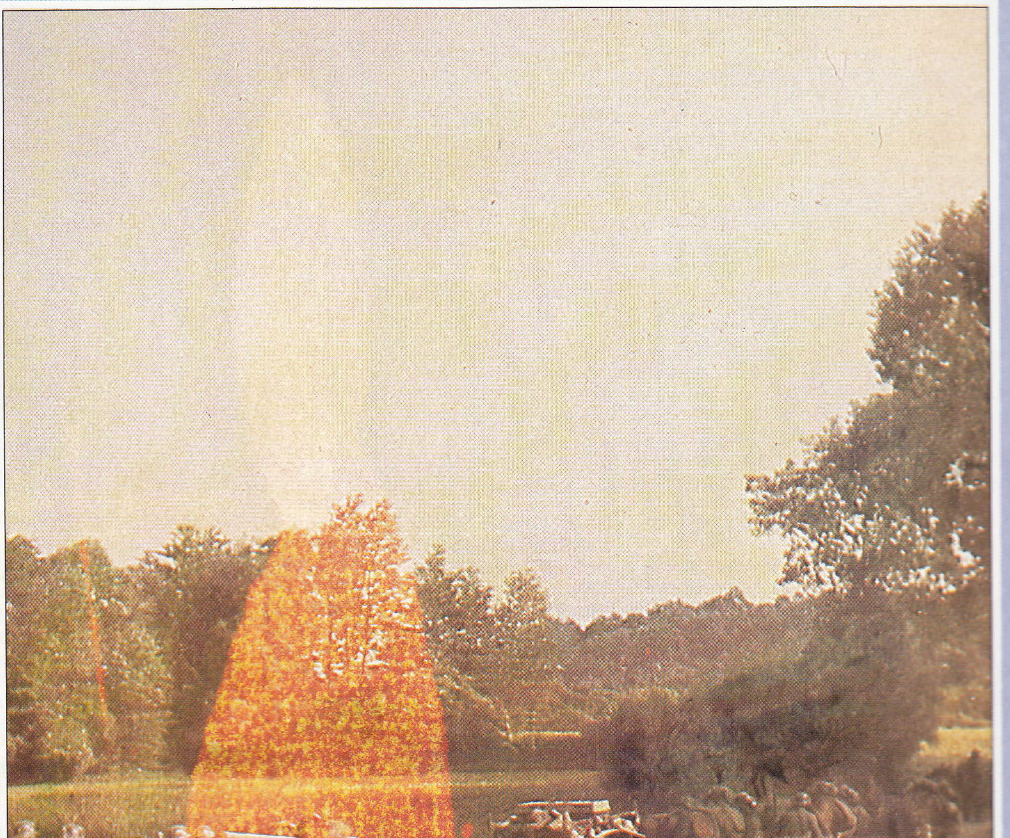
Field artillery organization

In German army use the field artillery was organized into artillery regiments. Each regiment had the usual headquarters unit and a headquarters battery which contained the various survey, meteorological and signal sections. The rest of the regiment was formed into four battalions. Two of these were 105-mm (4.13-in) battalions, one was a 75-mm (2.95-in) battalion and the other a 150-mm (5.9-in) heavy howitzer battalion. There were numerous variations upon this basic theme, but the emphasis was on 105-mm (4.13-in) howitzers. Each 105-mm (4.13-in) battery had three batteries, each with four or six howitzers.

Almost as soon as the 105-mm (4.13-in) howitzer battalions went into action in Poland in 1940 the gunners made their usual calls for yet more range from their charges. It was possible to increase the range of the leFH 18 simply by using a more powerful propellant charge, but the problem there was that any increase in charge would take the recoil forces over the safety limit of the carriage. A simple solution was to add a muzzle brake to the barrel to absorb the bulk of such increased forces, and thus the 10.5-cm leFH 18M was developed. Several muzzle brake configurations were tried before a correct compromise was found: one early attempt to increase range on the leFH 18 had centred on the use of a light 88-mm (3.46-in) shell fired from the 105-mm (4.13-in) barrel using sabot liners; as the shell emerged from the muzzle the sabot liners broke off and fell to the ground, leaving the 88-mm (3.46-in) shell with the muzzle energy to reach greater ranges than the normal 105-mm (4.13-in) shells; but if a muzzle brake was fitted the sabot liners fouled the muzzle attachment, and it was some time before a satisfactory solution was discovered.

The leFH 18M entered service in 1940, just in time for the campaign against France. The leFH 18M came through that episode with flying colours, but the next major campaign was to prove rather less successful. That was the invasion of the Soviet Union in 1941. All went well until the approach of the winter season when a succession of freezes and thaws turned

This leFH 18 crew is about to experience the rigours of the first winter of the Russian campaign. Seen in action at Orel, the sturdy howitzer was too heavy to be easily handled in the endless mud and ice of autumn and winter in the USSR.



While the Panzer forces grabbed the headlines from the first days of the war, the majority of the Wehrmacht marched on their own feet or were drawn by horses. This howitzer team is crossing a temporary bridge during the Polish campaign.

the terrain into mud. In this mud the howitzers sank to their axles and the 'strength through weight' attributes of the Rheinmetall design turned into disaster. The leFH 18 series of howitzers proved to be dreadful things to move in muddy conditions, and many were lost or abandoned to the Red Army simply because they could not be moved out of the way of sudden advances or raids. Thus the design showed itself to be too heavy for its field role. Something had to be done if the German army was to fight on in the dreadful conditions of the Eastern Front.

In the short term there was no easy solution. Despite the best endeavours of the industrial planners not all leFH 18s were pulled by tractors. Many batteries had to rely on horses and these unfortunates had to struggle on as best they could throughout the worst that the terrain and weather could produce. They had a difficult time. The Red Army, despite its huge losses in men and equipment during 1941, constantly attacked when things were at their worst and it was the turn of the Germans to lose men and weapons.

But somehow the German army survived the winter of 1941-2 and prepared for the future. The leFH 18 batteries thundered away throughout 1942, while back in Germany a solution to the weight problem was urgently sought. The result was a typical German design compromise: the designers realized that a complete redesign would be needed to make any really useful reductions, but that such a programme would take time, a commodity that was not on the Germans' side by that stage of the war. So in an attempt to make some sort of significant weight reduction a lighter carriage was adopted. This carriage was that of the 7.5-cm Pak 40 anti-tank gun, and was in production and just capable of taking the stresses of the far weightier howitzer: a bit of jiggery-pokery on the howitzer cradle and a new howitzer was ready for issue.

New designs

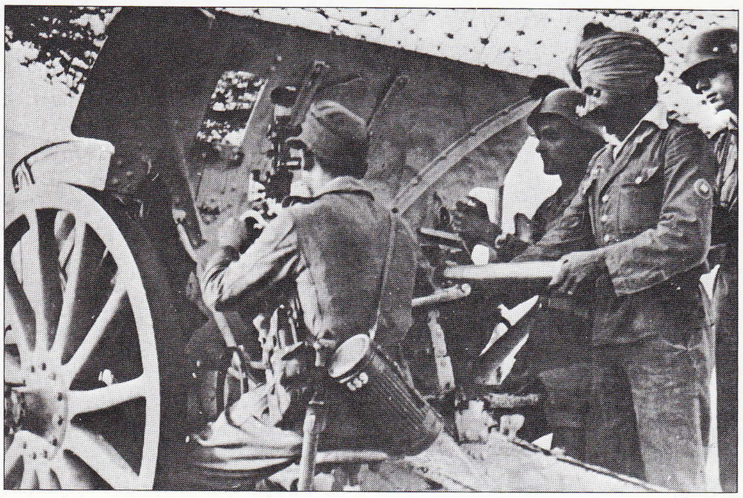
The compromise design was known as the 10.5-cm leFH 18/40. It used the same barrel assembly as the leFH 18M and was rushed into service. It proved to be not much of a success as the weight reduction was minimal (to the extent of pointlessness), and the howitzer/carriage combination gave constant troubles; but it could be produced in quantity, and by 1943 quantity was becoming more important for the Germans than quality. It should not be thought that the introduction of the leFH 18m and leFH 18/40 models made any different to those leFH 18 units already in service. They used their charges right until the war ended and there never were enough new howitzers to hand for their replacement.

During 1942 and 1943 efforts were made to redesign the basic weapon, but these came to nothing. Most that reached the prototype stage soon showed themselves too heavy and as the production demands were so great, any diversion of effort towards new designs had to be on a low priority. This did not stop the three main German armament manufacturers from trying. Krupp, Rheinmetall and Skoda all attempted to answer a staff request for a new 105-mm (4.13-in) howitzer family known as the '43' class. The '43' class was part of a new range of artillery weapons that would have 360° on-carriage traverse and the ability to fire at high angles of elevation for firing in forest conditions. All three manufacturers came up with proposals to meet these demands but only Skoda produced hardware. This was a very advanced model with the barrel assembly mounted on a cruciform carriage that allowed the desired 360° traverse and the required elevation. On tow the carriage folded up, two of the legs lying alongside the barrel. The Krupp and Rheinmetall submissions were essentially similar, but none of them got anywhere for by the time they were ready there were neither time nor facilities on hand to develop them further and the war ended with only prototypes completed.

But that was not quite the end, for some years after the war ended the Soviet artillery designers came up with a weapon that embodied virtually all the features of the '43' weapons. This Soviet design is yet another howitzer, the 122-mm (4.8-in) D-30, an excellent modern design that is still in widespread front-line use all around the world. So in a way it can be said that the German 105-mm (4.13-in) howitzers are still making their mark.

GERMANY

7.5-cm Feldkanone 16 nA and leichte Feldkanone 18



The Model 16 field gun seen here is being used to train members of the Indian Legion, one of the units raised by the Germans from disaffected prisoners of war to fight against their former comrades.

Almost as soon as the German army began to adopt new field guns in the late 19th century they adopted the calibre of 77 mm (3.03 in) as their standard field gun calibre. In 1896 they produced the **C/96** of this calibre, and in 1916 updated and revised the design to produce the **7.7-cm FK 16** (*Feld-Kanone*, or field gun, and 16 for 1916).

After 1918 there was a drastic rethink of German weapon practices, and among the changes that emerged from this study was the adoption of a new standard calibre of 75 mm (2.95 in); this calibre was (and still is) a standard field gun ammunition calibre, so the Germans were only following a well trodden path. The Versailles Treaty had left the rump of the German army with a stockpile of the old FK 16s, so in order to modernize these guns they were rebarrelled with new 75-mm (2.95-in) barrels. The guns were then known as the **7.5-cm FK 16 nA**, with the nA denoting *neuer Artillerie*, or new model.

The rebarrelled guns were issued during 1934, initially to horse-drawn batteries supporting cavalry units. The Germans continued to use horse cavalry units until 1945, but by then the FK 16 nA had fallen out of use for it was really a relic of a past era, and was as such too heavy and lacking in mobility for the cavalry role. Instead many were relegated to the training role or were issued to various second-line units. Large numbers were still in service when the war ended, and one fired its way into history when it held up an Allied armoured formation for some time during the fighting near the Normandy beach-heads in June 1944. That particular gun was not destroyed until it had knocked out at least 10 Allied tanks.

Even while the rebarrelling of the old FK 16 carriages was under way a call for a new design of cavalry gun was put out. During 1930 and 1931 both Krupp and Rheinmetall produced designs, and although the Krupp design was finally chosen it was not until 1938 that the first examples were issued for service. The new design became the **7.5-cm leFK 18** (*leichte Feldkanone*, or light field gun), and it had such modern features as a split trail carriage to increase the on-carriage traverse (so useful for anti-armoured warfare) and a range of ammunition that included a hollow-charge warhead for use against tanks. The leFK 18 was judged to to be a great success. Its range was less than that of the weapon it was intended to replace, and the complex carriage made it an expensive and difficult item to produce. Consequently not many were produced and the emphasis for field artillery calibres changed to 105 mm (4.134 in). However, the leFK 18 was kept in production for export sales to gain influence and foreign currency. Some sales were made to various South American countries and in one of them (Brazil) the leFK 18 is still in limited use.

Specification

FK 16 nA

Calibre: 75 mm (2.95 in)

Length of piece: 2.70 m (106.3 in)

Weight: travelling 2415 kg (5,324 lb) and in action 1524 kg (3,360 lb)

Elevation: −9° to +44°

Traverse: 4°

Muzzle velocity: 662 m (2,172 ft) per second

Range: 12875 m (14,080 yards)

Shell weight: 5.83 kg (12.85 lb)

Specification

leFK 18

Calibre: 75 mm (2.95 in)

Length of piece: 1.94 m (76.4 in)

Weight: travelling 1324 kg (2,919 lb) and in action 1120 kg (2,470 lb)

Elevation: −5° to +45°

Traverse: 30°

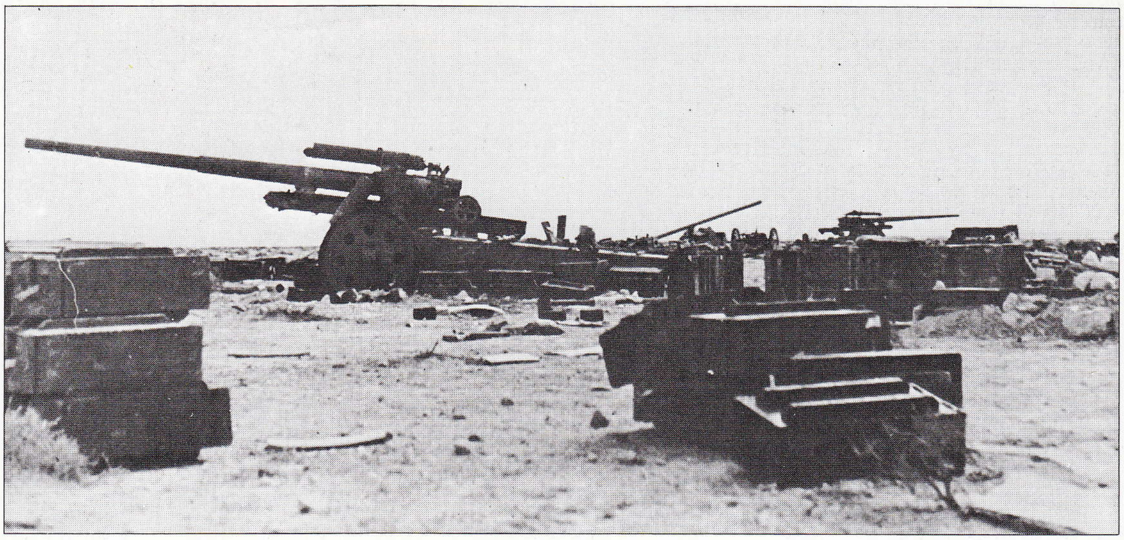
Muzzle velocity: 485 m (1,590 ft) per second

Range: 9425 m (10,310 yards)

Shell weight: 5.83 kg (12.85 lb)

GERMANY

10.5-cm Kanone 18 and 18/40



A 10.5-cm K 18 stands in splendid isolation in the middle of an abandoned German field position in the Western Desert. In the background is one of the famous '88' Flak guns, giving an indication that the position was intended to be some form of strongpoint.

Among the post-war requirements for a new German artillery park to replace the lost relics of World War I was that for a new long-range gun for use by corps rather than field artillery batteries. This project was one of the very first put out to the underground German armaments industry, for by 1926 both Krupp and Rheinmetall had produced specimen designs and by 1930 both were ready with prototype hardware.

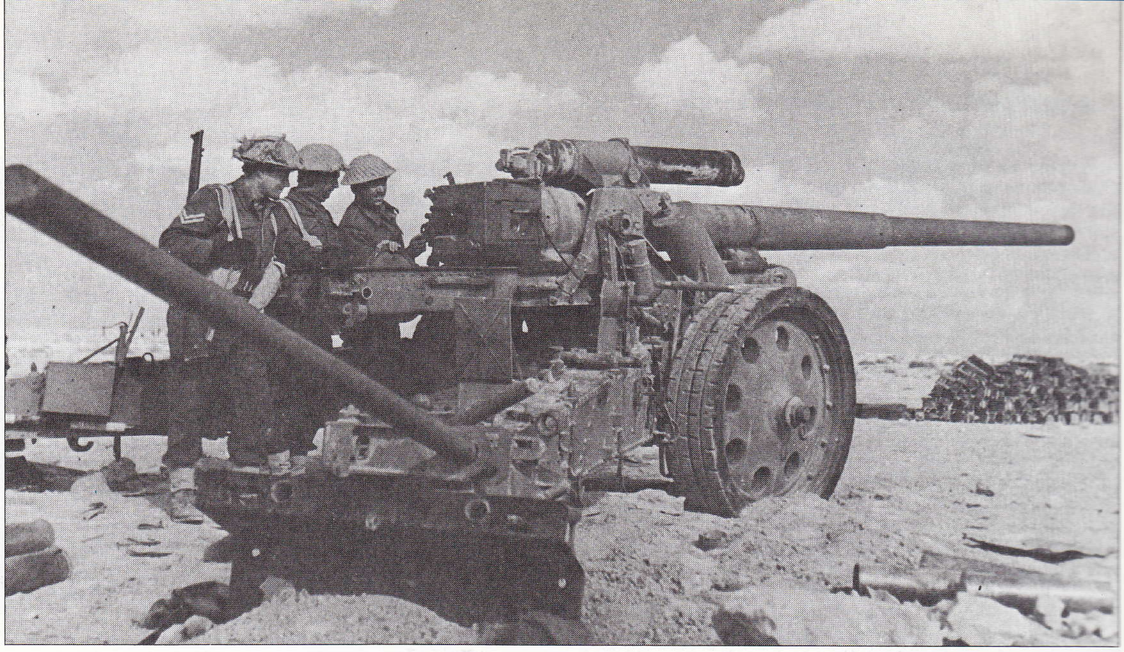
As it turned out the German army could not decide which design to approve; in the end it compromised by accepting the Rheinmetall barrel and the Krupp carriage. The Krupp carriage was destined to become one of the most widely used of all the German artillery carriages, for it was the same as that used on the larger 15-cm sFH 18 howitzer series. It was 1934 before the first guns actually reached the troops and for a while the new gun, known as the **10.5-cm K 18** (*Kanone*, or gun), was the standard weapon of the medium artillery batteries.

This state of affairs did not last long for the choice of 105-mm (4.134-in) calibre for a medium gun was to prove an unhappy one. In a nutshell the gun was too heavy for the weight of projectile fired. The larger 150-mm (actually 149 mm/5.87 in) howitzers fired a much more efficient projectile over almost the same range and at no great increase in weapon weight. There was also another snag: when the K 18 entered service it was at a time when the German army had yet to become even partially mechanized, so the guns had to be pulled by horse teams. The gun weighed too much for one horse team to tackle, so the barrel and carriage had to be towed as separate loads, which was a bit much for a 105-mm (4.13-in) gun. Later on the introduction of half-tracked tractors enabled the piece to be towed in one load, but by then the K 18 was on a very low production priority.

In order to make the K 18 a more powerful weapon, the German staff planners called for an increase in range. There was no way to produce this increase without lengthening the length of the barrel from the original L/52 to L/60. The first of these improved models was ready in 1941 and was known as the **10.5-cm K 18/40**, but it was not put into production until much later when the designation had been changed yet again to **10.5-cm sK 42** (*schwere Kanone*, or heavy gun). Very few were actually produced.

By 1941 the disadvantages of the K 18 and its later versions had been recognized, but there remained a role for them where their weight and bulk would be of a relatively minor disadvantage, namely coastal defence. Weapons for the Atlantic Wall, at that time still under construction, were in great demand and short supply, so the K 18 was assigned to that relatively static role. As a coastal defence weapon the piece had a considerable advantage in its long range, even if the projectile weight was still rather low. To enable it to be used to greater advantage when firing at marine targets a new range of ammunition was introduced, among which was a special sea marker shell for ranging purposes.

Specification
10.5-cm k 18
Calibre: 105 mm (4.134 in)
Length of piece: 5.46 m (214.96 in)
Weight: travelling 6434 kg (14,187 lb) and in action 5624 kg (12,400 lb)
Elevation: −0° to +48°
Traverse: 64°
Muzzle velocity: 835 m (2,740 ft) per second
Range: 19075 m (20,860 yards)
Shell weight: 15.14 kg (33.38 lb)



British infantry examine a 10.5-cm K 18; note the sheer size of this gun. In the foreground is a handspike used to move the trail legs either for a rapid change of traverse or to join them together for a move to a new position.

USSR

76.2-mm Field Gun Model 00/02 and 02/30

The family of field guns based on the old Russian 00/02 design are among that group of weapons which are little known or regarded but are yet among those which have provided excellent service over a long period. They are still hardly known outside the Soviet Union, but they were used throughout two world wars (and in a great number of other conflicts as well) and have all played their part in world history.

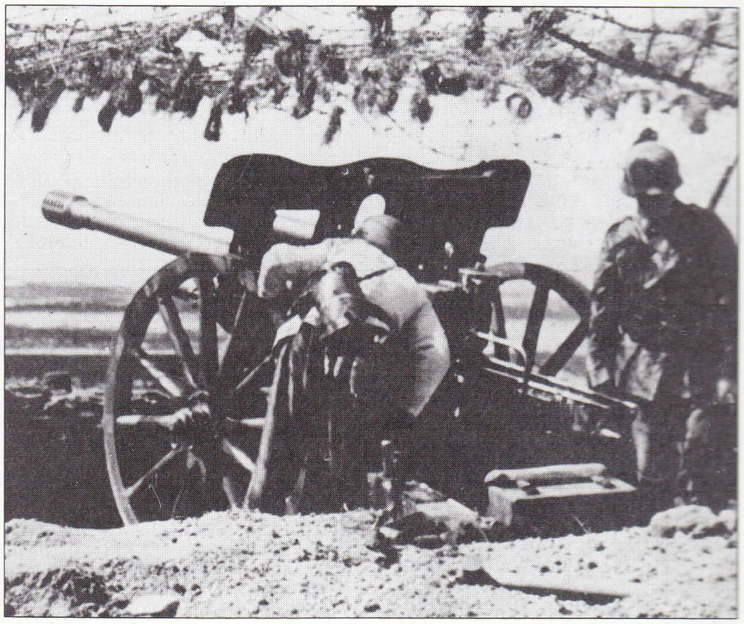
The original gun in the series was the Russian **76.2-mm Field Gun Model 00**, produced in 1900 by Putilov. The origins of the Model 00 may have been in a Krupp design, for the Russian weapon certainly had many of the current Krupp features, but by 1902 the full production model, the **Model 00/02** was being issued to the Tsarist armies. The type was used throughout the many large-scale campaigns on the Eastern Front in World War I, and throughout them all was used in an unspectacular but effective manner.

After the upheavals of 1918 the Model 00/02 was retained by the new Red Army but numbers were either sold or handed over to some of the new Baltic States and such nations under Soviet influence such as Finland. Poland also received a batch which they proceeded to convert from the original 76.2-mm (3-in) to 75-mm (2.95-in) calibre to match the rest of their French-supplied equipments. The Poles knew the gun as the **armata wz 02/26**, and it was still in service when Germany attacked in 1939, examples passing into German service being designated **7.5-cm FK 02/26(p)**.

In the Soviet Union the Red Army decided to modernize its large but elderly gun stocks and the Model 00/02 was an early candidate for the process. In 1930 most of the in-service guns were updated by the introduction of new ammunition, better propellants and in some cases new barrels. To confuse matters some guns retained their original L/30 barrels while others were fitted with entirely new L/40 barrels. Both of these modernized guns were then known as the **Model 02/30**, and became two of the standard Red Army artillery field pieces. Large numbers were in use when the Germans invaded in 1941, and the Germans in turn took over the types as two of their own standard field weapons (**7.62-cm FK 295/1(r)** for the L/30 and **7.62-cm FK 295/2(r)** for the L/40). The guns were later relegated to the usual round of second-line units and Atlantic Wall beach-defence purposes.

The Model 02/30 was not used only by the Red Army. Numbers found their way all over the world, especially in the years following 1945 when many started to appear in the Far East. Large numbers were handed over to the Communist Chinese, who used them both against their Nationalist foes and later against the United Nations forces in Korea. The type turned up again in the hands of the Viet Minh in Indo-China and it may be doubted if the last has yet been heard of this gun.

For all its longevity and variety of forms, the Model 00/02 and Model 03/30 were entirely orthodox guns in almost every way. Most never lost their original spoked wheels or their simple box trails, and the majority appear to have retained their gun shields throughout their service lives. They must have been produced in thousands, but perhaps the greatest reasons for their longevity were their essential simplicity and design to meet the worst rigours of the Russian terrain and climate. Any weapon that could resist them could stand up to virtually anything.



Soviet field guns were captured in huge numbers during the early stages of the war in the east, and with Germany having a huge requirement for weapons both to continue the war and to control occupied territories many of these captured weapons were pressed into service. This 76.2-mm field gun is on the Atlantic Wall.

Specification
Model 00/03 (L/30 type)
Calibre: 76.2 mm (3 in)
Length of piece: 2.286 m (90 in)
Weight: in action 1320 kg (2,910 lb)
Elevation: −5° to +37°
Traverse: 2.66°
Muzzle velocity: 646 m (2,119 ft) per second
Range: 12400 m (13,565 yards)
Shell weight: 6.4 kg (14.11 lb)

USSR

76.2-mm Field Gun Model 1936

By the early 1930s the Red Army artillery staff was becoming aware that its stock of field pieces was falling behind those of the rest of Europe in power and efficiency, and so in the early 1930s the USSR began a programme for new weapons. One early attempt, made in 1933, was the placing of a new 76.2-mm (3-in) barrel on the carriage of a 107-mm (4-in) field gun, but this was intended only as a stopgap until the introduction of what was intended to be one of the best all-round field guns in the world.

The new gun was introduced in 1936, and was thus known as the **76.2-mm Field Gun Model 1936**, usually known as the **76-36**. It was an excellent design that made quite an impression on artillery designers elsewhere when the details became known over the next few years. The 76-36 had a very long and slender barrel mounted on a deceptively simple split-trail carriage that provided a wide angle of traverse. This wide angle had been deliberately designed into the weapon for even by that time (the early 1930s) the Red Army's anti-tank defence philosophy had been formulated to the extent where every gun and howitzer in the Soviet armoury had to have its own inherent anti-tank capability. Even when firing a standard high explosive shell the 76-36 had a powerful anti-armour effect, and this factor was a constant benefit throughout the service life of the gun.

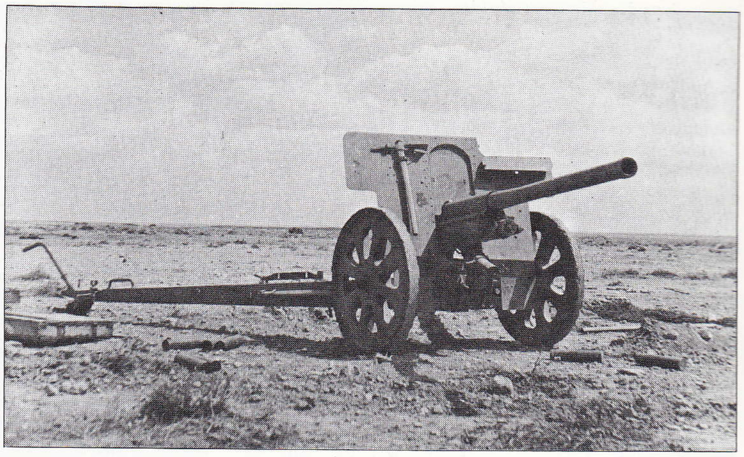
The 76-36 first saw active service in Finland in the Winter War of 1939-1940. It performed effectively enough in this campaign, but in its second major deployment it did not fare so well. The second campaign was the invasion of the Soviet Union by Germany, in which it was not so much that the 76-36s did not perform well but rather that they had little chance to do anything. The advancing German armies moved so fast that whole Soviet armies were cut off and destroyed. Huge numbers of 76-36s fell into German hands and, more disastrouslsy for the Soviets, the Germans also captured a great deal of the manufacturing plant that produced the guns. Thus almost the whole Red Army stock of 76-36 guns was lost within a very short time.

German artillery experts swarmed over the captured guns. They took measurements, carried out their own firing trials and came up with two suggestions. One was that the 76-36 should become a standard German field gun, **7.62-mm FK 296(r)** as there was enough ammunition to hand to make them useful for some time, and long-term plans were laid to produce more ammunition in Germany. The second suggestion was also acted upon. That was to convert the 76-36 into a specialized anti-tank gun for use against even the most powerfully armoured Soviet tanks, and this suggestion was also implemented. Large numbers of 76-36 guns were taken to Germany, and there modified to take new ammunition for the guns to become the **7.62-cm Pak 36(r)**, one of the best all-round anti-tank guns of World War II. The changes for the anti-tank role also involved some on-carriage changes (such as all the fire control wheels being used by the layer instead of the original two men) and a few other modifications.

Thus a Soviet field gun ended up being used just as much by the Germans as by the Red Army. With the disruption in production imposed by the German advances the 76-36 was never put back into full production, although spare parts were made in a few places for use on the few 76-36s remaining in Red Army hands. By 1944 the 76-36 was no longer a Red Army weapon, for they had by then a new gun in service.

Specification

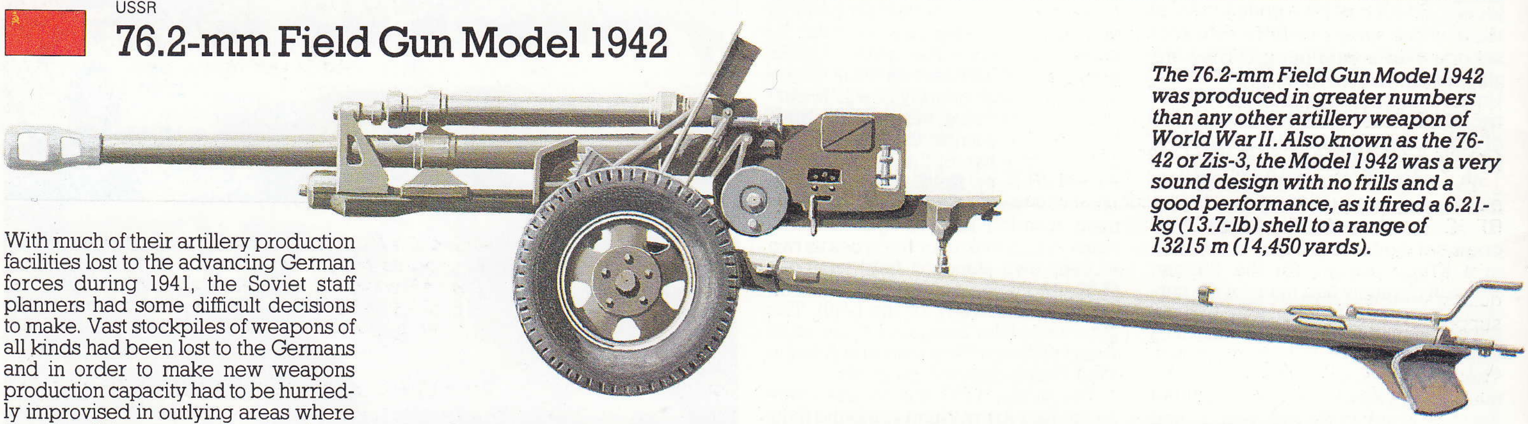
Field Gun Model 1936
Calibre: 76.2 mm (3 in)
Length of piece: 3.895 m (153.3 in)
Weight: travelling 2400 kg (5,292 lb) and in action 1350 kg (2,977 lb)
Elevation: −5° to +75°
Traverse: 60°
Muzzle velocity: 706 m (2,316 ft) per second
Range: 13850 m (15,145 yards)
Shell weight: 6.4 kg (14.1 lb)



A long way from home for this 7.62-cm Model 1936 field gun, taken from the Eastern Front by the Germans in 1941 and converted for use as a very effective anti-tank gun in North Africa.

USSR

76.2-mm Field Gun Model 1942



The 76.2-mm Field Gun Model 1942 was produced in greater numbers than any other artillery weapon of World War II. Also known as the 76-42 or Zis-3, the Model 1942 was a very sound design with no frills and a good performance, as it fired a 6.21-kg (13.7-lb) shell to a range of 13215 m (14,450 yards).

With much of their artillery production facilities lost to the advancing German forces during 1941, the Soviet staff planners had some difficult decisions to make. Vast stockpiles of weapons of all kinds had been lost to the Germans and in order to make new weapons production capacity had to be hurriedly improvised in outlying areas where factories did not even exist. One factor in the Soviet's favour was that their weapon design bureaux were inherently conservative and made few innovations, depending rather on the gradual evolution of design and on the practice of using a new gun or carriage in conjunction with an existing carriage or gun.

This practice served the Soviets well after 1941, for in 1939 they had introduced a new gun known as the **76.2-mm Field Gun Model 1939**, or **76-39**. This was introduced mainly because it was realized that good as the 76-36 was, it was really too bulky and a smaller design was thus desirable. The 76-39 used a shorter barrel on the carriage derived from that of the 76-36. When the Germans struck in 1941 they did not capture the main plant for 76-39 barrels, though they did take the carriage plant for the 76-36. Thus it was possible to use the barrel and recoil mechanism of the 76-39 on a new carriage to allow production to once more get under way. The result was the **76.2-mm Field Gun Model 1942**, later known as the **76-42** or **Zis-3**.

The 76-42 was to achieve fame by being produced in greater numbers than any other gun during World War II. It was produced in its thousands, and if this had not been enough it turned out to be an excellent all-round weapon capable of being used not only as a field gun but an anti-tank gun, a form of tank gun and a self-propelled gun. The new carriage was a very simple but sturdy affair using split pole trails and a simple flat shield. The gun assembly was modified to take a muzzle brake to reduce firing stresses and keep the carriage as light as possible and throughout the design process emphasis was given to ease of mass production. Once in action the 76-42 proved light and easy to handle, and it also had excellent range. To simplify the Red Army's logistic load the ammunition was ruthlessly standardized to the point where the 76-42 used the same types of ammunition as the 76.2-mm (3-in) guns carried by the T-34 tanks and many other similar guns. Only two basic types of projectile were used in World War II, namely HE and AP (though smoke was fired on occasion).

The 76-42 was produced in such large numbers that it remains in service with some nations to this day. Examples were encounterd in Korea and Indo-China, and the gun is still widely used in Africa and the Far East. The 76-42 has been widely issued to various guerrilla groups such as the PLO and SWAPO in South West Africa, and there seems to be no time limit on its active life.

Numerous attempts were made to mount the 76-42 on various self-propelled carriages but only one was ever produced in any quantity. This was the SU-76, another ex-Soviet weapon that is still in widespread service.

Specification

Field Gun Model 1942
Calibre: 76.2 mm (3 in)
Length of piece: 3.246 m (127.8 in)
Weight: travelling and in action 1120 kg (2,470 lb)
Elevation: −5° to +37°
Traverse: 54°
Muzzle velocity: 680 m (2,230 ft) per second
Range: 13215 m (14,450 yards)
Shell weight: 6.21 kg (13.7 lb)

A 76.2-mm Field Gun Model 1942, or Zis-3, in action in the ruins of the Tractor Works in Stalingrad during the ferocious fighting in the winter of 1942-3. Both sides discovered that this gun had a very good anti-tank capability.

Armed Forces of the World

US Air Force

Part 7

As well as combat elements within the continental USA, the US Air Force also has two major overseas commands, Pacific Air Forces (PACAF) and the United States Air Forces in Europe (USAFE), these being primarily tactical organizations. And like TAC they have been considerably updated in recent years, the F-4 Phantom giving way to A-10s, F-15s and F-16s in substantial numbers.

Now little more than a pale shadow of the massive organization which existed at the height of the Vietnam War, PACAF is still nevertheless a most powerful force and one that consists of two numbered air forces plus a couple of smaller direct-reporting elements on the island of Oahu, Hawaii. Strategically located in the Pacific Ocean, the chain of islands which constitute the state of Hawaii has a special significance in US military history for it was here, at Pearl Harbor, that the Japanese attack was directly responsible for bringing the massive American war machine into World War II in December 1941. More recently, Hickam AFB, Hawaii, was an important staging post in the supply lines to South East Asia during the Vietnam War and Hickam still serves as PACAF headquarters today.

In terms of size, the 5th Air Force at Yokota, AB, Japan, is the most significant component of PACAF, and this organization exercises control of three fully-fledged fighter wings via two Air Divisions. At Kadena AB, Okinawa, the 313th AD administers the 18th TFW with three squadrons of F-15C Eagles plus a single squadron operating reconnaissance RF-4C Phantom IIs, the latter also maintaining a small detachment at Osan AB in Korea.

Sharing Yokota with the 5th Air Force headquarters is the 475th Air Base Wing, essentially a support organization tasked with ensuring smooth running of the air base itself although it also operates a handful of Bell UH-1F Iroquois helicopters and Rockwell T-39A Sabreliners mainly on communications tasks.

Elements of the 314th Air Division, which has its headquarters at Osan AB, are rather more widely dispersed, being distributed between four air bases in Korea. At Kunsan, the 8th TFW (the celebrated 'Wolf Pack') has two squadrons of F-16 Fighting Falcons, this wing having been reduced in size when it re-equipped with the F-16, losing one squadron to the 51st TFW. Located at Osan, the latter controls four squadrons in all, fairly widely scattered and comprising one F-4E Phantom II squadron at Taegu; one A-10A Thunderbolt II squadron at Suwon; one F-4E squadron at Osan itself and one Rockwell OV-10 Bronco squadron for forward air control duty, also at Osan.

By comparison, the 13th Air Force at Clark AB in the Philippines is a fairly puny command, for this has just one major aircraft operating element, namely the 3rd TFW with single squadrons operating the Northrop F-5E Tiger II for aggressor training, the F-4E for close air support and limited air superiority, and the F-4G for defence-suppression. All three squadrons use Clark as their main base, but the F-5Es frequently deploy to other bases (most notably Kadena) to spread the air combat manoeuvring gospel to other PACAF elements and to combat units of allied air forces in this part of the world.

Although much reduced in size in recent years, PACAF has been significantly updated with regard to equipment, and limited expansion is very much in mind for the future, a process which will witness the return of USAF combat aircraft to mainland Japan in about 1985 when a two-squadron wing of F-16s is to be established at Misawa.

One of the USAF units at the 'sharp end' is the 51st Composite Wing, based at Osan AB, South Korea. Here a McDonnell Douglas F-4E Phantom from the 336th TFS makes a slow fly-by with slats extended during Operation 'Team Spirit '77'.

After years of seeming neglect in deference to the demands of the war in South East Asia, the US Air Force's second major overseas command, USAFE, is now in far better shape, having received a long-overdue infusion of new and more modern equipment whilst at the same time being expanded somewhat in overall size. Control in peacetime is vested in USAFE headquarters at Ramstein, West Germany, but it should be noted that virtually all of the units which make up this command would come under NATO auspices in the event of conflict and, accordingly, some of the more senior commanders are 'dual hatted', a good example of this being provided by the Commander-in-Chief of USAFE, whose NATO role is that of Commander, Allied Air Forces Central Europe.

With approximately 60,000 personnel and some 700 aircraft on charge, USAFE organization follows largely geographical lines, each of the three numbered air forces being responsible for operations in a specific area.

In the United Kingdom there is the 3rd Air Force, predominantly equipped with the General Dynamics F-111 for long-range strike duties, the 20th TFW at RAF Upper Heyford being a three-squadron wing with the F-111E model whilst the 48th TFW at RAF Lakenheath has four F-111F squadrons. Expansion in the size of this force is imminent, Upper Heyford having been selected to receive approximately 20 examples of the EF-111A 'Electric Fox' for electronic countermeasures duties in support of strike elements during 1984, and the 1st ECS may well have begun to form by early 1984.

A fairly recent addition to the USAFE inventory, the Fairchild Republic A-10A Thunderbolt II, equips the 81st TFW which is stationed at the so-called 'twin base' complex of Bentwaters and Woodbridge, these two separate and distinct airfields being just a few miles apart. Currently the largest operational wing in the entire US Air Force, the 81st TFW has no less than six squadrons and a total fleet of 108 A-10As, about a quarter of which are usually deployed in West Germany where this wing maintains four Forward Operating Locations (FOLs), each with about eight A-10s attached on a constantly-rotating basis. Detachment One is located at Sembach, other FOLs being at Leipheim (Det. 2), Norvenich (Det. 3) and Ahlhorn (Det. 4).

Aggressor services for USAFE's combat echelons are fulfilled by the 527th TFTAS at RAF Alconbury operating Northrop F-5E Tiger IIs, and forming part of the 10th TRW which also has a single McDonnell Douglas RF-4C Phantom II-equipped reconnaissance squadron, whilst RAF Mildenhall's 513th TAW provides support services for transient MAC aircraft, and for rotational MAC Lockheed C-130 Hercules and SAC Boeing KC-135 Stratotankers. The 513rd TAW also looks after the 10th ACCS which has a fleet of four Boeing EC-135H airborne command posts.

Other facilities under 3rd Air Force control are the support bases at Greenham Common, Sculthorpe and Wethersfield, all having been used in recent years for exercises or to permit runway repairs to be performed at the major bases already detailed. Greenham Common has been chosen to serve as a base for the BGM-109G Ground-Launched Cruise Missile (GLCM), the 501st Tactical Missile Wing having already been established to operate this highly controversial weapon. Extensive construction work at this base reached completion towards the end of 1983, with deployment following shortly after.

Elements within close proximity to the Mediterranean report to the 16th Air Force, located at Torrejon AB, Spain, the smallest USAFE command

12 Pass (8)

Three McDonnell Douglas F-15A Eagles of the 36th TFW at Bitburg, West Germany, participate in Operation 'Arctic Express '78', on detachment to Bodo, Norway. This was a multi-national combat readiness exercise, at a time when combat readiness of many front-line USAF units was abysmally low.

in terms of combat aircraft at its disposal, possessing just one fighter wing. This, the 401st TFW at Torrejon, has operated F-4 Phantom IIs for many years, but is at the time of writing well advanced in the process of transition to the General Dynamics F-16 Fighting Falcon. Other 16th Air Force assets comprise the 406th Tactical Fighter Training Wing at Zaragoza AB in Spain, the 40th Tactical Group at Aviano AB in Italy and TUSLOG (Turkey/US Logistics) at Ankara and Incirlik in Turkey, all overseeing the activities of tactical aircraft deployed from other USAFE commands on a rotational basis for training purposes. The 7206th Air Base Group at Hellenikon (Athens Airport) also provides support and command services for USAFE elements active in Greece and to Boeing RC-135s deployed by SAC for the acquisition of electronic intelligence, whilst Comiso AB in Sicily has been selected to serve as a base for cruise missiles and these will come under the control of the 487th TMW when deployment occurs in due course.

Numerically the largest USAFE echelon, the 17th Air Force has its headquarters at Ramstein AB in West Germany and has also undergone its fair share of modernization recently, a process which is expected to continue with additional F-16s being anticipated in the mid-1980s. With the exception of a single F-15 squadron, the 32nd TFS, at Soesterberg in the Netherlands, all 17th Air Force forces are located in West Germany, distributed between six major bases. Responsibility for air superiority rests largely with the F-15Cs equipping three squadrons of the 36th TFW at Bitburg, this more sophisticated model of the Eagle having only recently supplanted the F-15As delivered to this wing in the latter half of the 1970s. At Hahn, the 50th TFW is now fully operational on the F-16 Fighting Falcon following conversion from the F-4E Phantom II during 1982-3, and this wing retains strike and close air support as its primary tasks although it also has a secondary air-to-air function, operating in conjunction with the F-15 which has a far more capable radar.

Spangdahlem's 52nd TFW will be the last USAFE unit to operate fighter Phantoms, currently controlling two McDonnell Douglas F-4E squadrons plus a third with the F-4G 'Wild Weasel' defence-suppression variant while, at Ramstein, the 86th TFW also has two F-4E squadrons, although these are expected to be replaced by the F-16 in the near future, when a third squadron will be activated. Reconnaissance requirements of the 17th Air Force are met by the 20 or so RF-4Cs of the 26th TRW at Zweibrücken, whilst control of air power is undertaken largely by the 601st Tactical Air Control Wing from Sembach, the latter unit having two OV-10A Rockwell Bronco FAC squadrons as well as one Sikorsky CH-53C squadron to assist in mobility of the various ground-based control centres which form part of this very large wing.

In addition to those elements described here, USAFE can also call upon SAC and MAC aircraft (either permanently-based or operating on a temporary duty basis) to assist in fulfilling its duties. Details of these can be found in the relevant sections.

UNITED STATES AIR FORCES IN EUROPE

HEADQUARTERS RAMSTEIN AB, WEST GERMANY
3RD AF, RAF MILDENHALL, UK
16TH AF, TORREJON AB, SPAIN
17TH AF, SEMBACH AB, WEST GERMANY

3RD AIR FORCE, RAF MILDENHALL, UK
10th TRW, RAF Alconbury, UK
  1 TRS (RF-4C)
  527 TFTAS (F-5E)
20th TFW, RAF Upper Heyford, UK
  55/77/79 TFS (F-111E)
  42 ECS (EF-111A)
48th TFW, RAF Lakenheath, UK
  492/493/494/495 TFS (F-111F)
81st TFW, RAF Bentwaters/Woodbridge, UK
  78/91/92/509/510/511 TFS (A-10A)
  Det 1 – Sembach AB, West Germany (TDY A-10A)
  Det 2 – Leipheim, West Germany (TDY A-10A)
  Det 3 – Norvenich, West Germany (TDY A-10A)
  DEt 4 – Ahlhorn, West Germany (TDY A-10A)
501st TMW, RAF Greenham Common, UK
  11 TMS – BGM-109G GLCM
513th TAW, RAF Mildenhall, UK
  10 ACCS (EC-135H)
  TDY C-130E/H from CONUS

16TH AIR FORCE, TORREJON AB, SPAIN
40th TG, Aviano AB, Italy (rotational fighters)
401st TFW, Torrejon AB, Spain
  612/613/614 TFS (F-16A/B)
406th TFTW, Zaragoza AB, Spain (rotational fighters for weapons training)
487th TMW, Comiso, Italy (BGM-109G GLCM)
7206th ABG, Hellenikon Airport, Athens, Greece (supports SAC RC-135 operations)
39th TACG, Incirlik AB, Turkey (rotational fighters)

17TH AIR FORCE, SEMBACH AB, WEST GERMANY
26th TRW, Zweibrucken AB, West Germany
  38 TRS (RF-4C)
32nd TFS, Soesterberg, Netherlands (F-15C/D)
36th TFW, Bitburg AB, West Germany
  22/53/525 TFS (F-15C/D)
50th TFW, Hahn AB, West Germany
  10/313/496 TFS (F-16A/B)
52nd TFW, Spangdahlem AB, West Germany
  23/480 TFS (F-4E)
  81 TFS (F-4G)
86th TFW, Ramstein AB, West Germany
  512/526 TFS (F-4E)
601st TCW, Sembach AB, West Germany
  20/704 TASS (OV-10A)
  601 TASS (CH-53C)
7005 ABS, Stuttgart Airport, West Germany (C-12A, CT-39A) (reinforcement unit)
4th TFW, Seymour-Johnson AFB, NC
  334/335/336/337 TFS (F-4E)

Note 1: The 4th TFW is dual-based and NATO-assigned although it forms part of Tactical Air Command's 9th Air Force whilst in the USA

Note 2: For details of MAC and SAC units operating in Europe on a rotational or permanent basis it will be necessary to refer to the relevant sections.

PACIFIC AIR FORCES

HEADQUARTERS HICKAM AFB, HI
5TH AIR FORCE, YOKOTA AB, JAPAN
13th AIR FORCE, CLARK AB, PHILIPPINES
15TH AIR BASE WING, HICKAM AFB, HI
326TH AIR DIVISION, WHEELER AFB, HI

5TH AIR FORCE, HEADQUARTERS YOKOTA AB, JAPAN
313th AD, Kadena AB, Okinawa
  18th TFW, Kadena, Okinawa
    12/44/67 TFS (F-15C/D)
    15 TRS (RF-4C: detachment at Osan AB, South Korea)
314th AD, Osan AB, South Korea
  8th TFW, Kunsan AB, South Korea
    35/80 TFS (F-16A/B)
  51st TFW, Osan AB, South Korea
    25 TFS (A-10A at Suwon, South Korea)
    36 TFS (F-4E)
    497 TFS (F-4E at Taegu, South Korea)
    19 TASS (OA-37B)
475th ABW, Yokota AB, Japan (CT-39A, UH-1F)
6112th ABW, Misawa, Japan (ACM training support)

13TH AIR FORCE, HEADQUARTERS CLARK AB, PHILIPPINES
3rd TFW, Clark AB, Philippines (CT-39A, C-12A)
  3 TFS (F-4E)
  90 TFS (F-4E/G)
  26 TFTAS (F-5E, T-38A, T-33A)
326th AD, Wheeler AFB, HI
  22 TASS (OV-10A)
15th ABW, Hickam AFB, HI (T-33A)
  9 ACCS (EC-135J)

Note: Other operational elements active in the Pacific area are to be found under direct SAC and MAC control.